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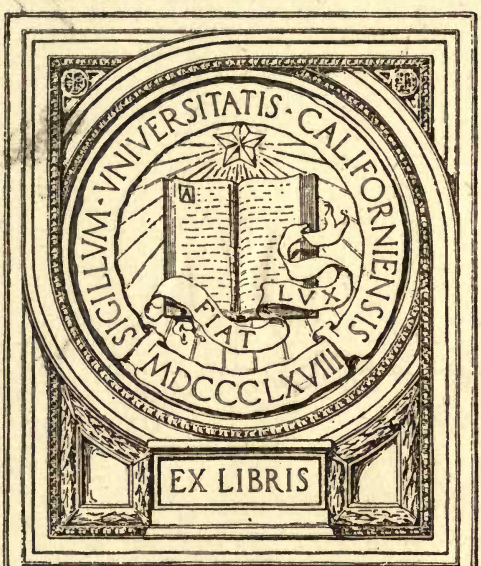
The Trees of North Carolina



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The flame of the dogwood and sumach
That fires the edge
Where the field carries up to the forest
Its purple of sedge;
The blue of the monkshood and aster,
The sourwood's wine,
And back on the hills the unshaken,
Sustaining green of the pine.

THE TREES OF NORTH CAROLINA

BY

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1916

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To the young people of North Carolina,---in the hope that as they learn to know their state better they may come to love her more.

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BY W. C. COKER
AND
H. R. TOTTEN

INTRODUCTION

In the preparation of this little book the authors have had in mind the need of a simple treatment of the trees of North Carolina for the use of any one who may be interested in them. Until now there has been no publication even approximating this character except Dr. Curtis' *Woody Plants of North Carolina* (1860), a valuable work, but long since out of print and out of date, and *Bulletin No. 6 of the North Carolina Geological Survey* by Pinchot and Ashe (1897), which is also out of print. *The Woods and Timbers of North Carolina,* by P. M. Hale (1883), was a republication of the reports of Dr. Curtis and others.

With the rapid advance of education and culture in our state it will not be long before some knowledge of nature will be desired by most of our citizens, and the size, beauty and economic importance of our trees should entitle them to first place in our interest and affection. Every high school graduate at least should know by sight the principal trees of the community, and we hope that this little book will make possible the beginning of such a delightful acquaintance. We have referred frequently to places and trees about Chapel Hill. This will be of great aid to the students here and through them will serve as examples for the whole State. The dates are the dates of

flowering as recorded at Chapel Hill. The few technical terms that we have found it necessary to use will be found explained in the *Glossary and Index.*

The flora of North Carolina is very rich, and in no way is it richer than in the beauty and variety of its trees. As will be seen from the following pages, there are native in this state, according to our conservative treatment of the species, one hundred and sixty-six kinds of plants that normally grow to tree size, and this is excluding a number of introduced trees that have escaped to a slight extent and are mentioned in the foot notes. To this number it would be easy to add at least a dozen more hawthorns by a less reserved treatment of that problematic group, and another dozen plants by including certain shrubs that occasionally reach the size of small trees.

In the number of its trees our state is superior to any of the other States of the Union, with the exception of Florida and Texas. Florida stands first with about 328 native trees, including 38 species of *Crataegus* (Small, *Florida Trees,* 1913); Texas is next with 198 native species, including only nine species of *Crataegus* (Lewis, *The Trees of Texas,* 1915), but this includes nine species that also grow in North Carolina and have been excluded by us as shrubs. Next after North Carolina comes Georgia with 134 trees (only six species of *Crataegus* counted) as estimated by Harper and the probable occurrence of about 20 more is suggested (*Southern*

Woodlands, Vol. I, No. 6, p. 32, 1908). In this list Harper includes about six plants that we have considered as shrubs, but this is largely offset by his treatment of *Fraxinus* and *Tilia* of which only one species is given of each. Alabama follows Georgia in the number of its trees which, as listed by Harper consist of 121 species, only five hawthorns included (*Geol. Survey of Ala., Monograph* 8, p. 189, 1913). He supposes that the number will reach 140 or 150 when the flora is better known. It is surprising to find that the large State of California has only 94 species (Jepson, *Trees of California,* p. 13, 1909). In North Carolina we have twenty-four oaks of tree size, while California has but thirteen. In Minnesota (Clements, et al., *Minnesota Trees and Shrubs,* p. iv, 1912), there are only 274 species of woody plants, trees, shrubs, and vines, while in North Carolina we have about 450-odd woody plants.

To a discerning person it is not necessary to say that to know the names of the trees and the few facts about them that are given in this book is no more than a beginning of the knowledge and interest that should result from a long and intimate association with them. There is in each tree a complex individuality which is too manifold and mutable for one to fully grasp in a lifetime of study, and what is found there will not be determined by its infinite possibilities, but by the limitations of our eyes and hearts. It is fascinating to observe the seasonal changes—the swelling of the buds and unfolding of the leaves with

their delicate colors, each kind differing from all others in shade; their growth and change in tone to maturity, and the putting on of more cheerful colors in anticipation of death; the expanding flowers with their structure, odor and insect visitors; the forming of the fruit, its ripening and its fate; the seeds with their germs and reserve foods and protective coats; the distribution and planting of the seeds; their sprouting and development into seedling and sapling; the slow growth of the tree to full stature and strength,—if in the kindness of nature we should be spared to abide with it so long.

In conclusion let us suggest to the reader that if for any reason he cannot find the name of a tree from this book he be not too easily discouraged, but observe it through the year and study the fruit and flowers as well as the leaves. If this does not settle the difficulty, a twig with several leaves of average size should be pressed, and if possible the fruits and flowers, and these should then be sent to one of the authors at Chapel Hill. We should take pleasure in seeing the specimens and in helping with the name. We should also greatly appreciate any data about trees that are rare or local or are found outside of the limits given in our descriptions. With anyone desiring help or further information, or who can give us information, we should be glad to correspond.

University of North Carolina,
Chapel Hill, N. C.
July 24, 1916.

KEY TO THE SPECIES*

I. Cone-Bearing Trees: Mostly Evergreen. Gymnosperms.

A. Leaves needle-like, united in bundles.
  Leaves five or more in a bundle..... *White Pine* (8)
  Leaves three or rarely four in a bundle.
    Leaves ten to fifteen inches long; cones five to ten inches long..... *Long-leaf Pine* (7)
    Leaves five to ten inches long; cones three to five inches long..... *Loblolly Pine* (2)
    Leaves six to ten inches long; cones less than three inches long ..... *Pond Pine* (6)
    Leaves three to four inches long; cones two to two and a half inches long..... *Black Pine* (5)
  Leaves two in a bundle.
    Cones about three inches long, prickles stout ..... *Table Mountain Pine* (4)
    Cones about two inches long or less, prickles weak.
      Branches scaly; leaves not twisted.... *Short-leaf Pine* (1)
      Branches nearly smooth; leaves twisted ..... *Scrub Pine* (3)

B. Leaves single, linear, roundish or flattened.
  Evergreen; cone not spherical.
    Leaves abruptly narrowed to a little stalk.
      Leaves extending in one plane; cones ½-¾ inch long ..... *Hemlock* (12)
      Leaves spreading in all directions; cones 1-1½ inches long ..... *Carolina Hemlock* (13)
    Leaves sessile.
      Leaves nearly round, not white beneath; cones pendulous.
        Leaves bluish-green (glaucous), cones persisting for years..... *Black Spruce* (9)
        Leaves yellow green; cones falling early ..... *Red Spruce* (10)
      Leaves flattish, white beneath; cones upright ..... *Balsam* (11)
  Not evergreen; cone spherical.
    Leaves spreading in two roms (one plane) ..... *Swamp Cypress* (14)
    Leaves pressed against the twigs and all around it ..... *Pond Cypress* (15)

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* Numbers preceded by the letter p. indicate the page, all others refer to the plant number.

Leaves very small, scale-like.
Fruit a small blue berry..... *Red Cedar* (18)
Fruit a little cone about the size of a pea ..... *Juniper* (16)
Fruit a cone ⅜-½ inch long..... *Arbor-Vitae* (17)

II. Broad Leaved Trees: Not Cone Bearing. Angiosperms.

Leaves evergreen, splitting into strips, grouped at the top of a single stout stem (Monocotyledons).
Leaves several feet wide, fan-shaped..... *Palmetto* (19)
Leaves not splitting into strips, usually not evergreen (Dicotyledons).
A. Leaves compound, alternate on the twig.
Leaves twice compound.*
Trunk and branches thorny or prickly.
Leaves less than one foot long..... *Honey Locust* (110)
Leaves more than two feet long.... *Hercules Club* (140)
Not thorny.
Leaflets with teeth ..... *China-berry Tree* (p. 73)
Leaflets without teeth.
Leaflets one-sided ..... *"Mimosa"* (p. 71)
Leaflets symmetrical ..... *Kentucky Coffee Tree* (p. 71)
Leaves once compound.
Odor offensive ..... *Tree of Heaven* (p. 73)
Odor not offensive.
Fruit a flat pod.
Branches with short thorns; twigs and leaf stems not sticky..... *Black Locust* (113)
Branches with or without short thorns; twigs and leaf stalks very sticky ..... *Clammy Locust* (114)
Branches without thorns; twigs and leaf-stalks not sticky..... *Yellow Wood* (112)
Fruit a small one-seeded capsule; branches prickly; leaves fragrant when bruised ..... *Prickly Ash* (115)
Fruit a small red berry; twigs smooth ..... *Mountain Ash* (85)
Fruit a small red berry; twigs densely fuzzy ..... *Staghorn Sumach* (116)
Fruit a nut, hull dividing into four parts when ripe.†
Bark flaky or scaly.‡

* The Honey Locust may also bear once compound leaves.
† In the Pig-nut Hickory the hull usually does not split into parts.
‡ In the Small-fruited Hickory the bark is sometimes only obscurely flaky below, but in such cases the upper part of the tree will show this character more clearly.

Leaves scurfy-hairy; shell of nut thin, hull thick..... *Scaly-bark Hickory* (27)
Leaves smooth.
Hull contracted into a neck at the base ..... *Pig-nut Hickory* (30)
Hull not contracted into a neck at the base.
Hull of nut thick, shell thin ..... *N. C. Scaly-bark* (28)
Hull of nut thin, shell thin *Small-fruited Hickory* (29)
Bark not flaky.
Leaflets smooth, broad; nut with a persistent hull and usually with a neck at the base..... *Pig-nut Hickory* (30)
Leaflets hairy, broad; nut with a thick shell ..... *White-heart Hickory* (32)
Leaflets with minute silvery or brownish scales below, narrow; hull of nut yellow with minute particles ..... *Pale Hickory* (31)
Leaves hairy, leaflets narrow to broad; nut bitter ..... *Bitternut* (33)
Leaflets smooth, narrow and numerous; nut bitter, flattened, rough ..... *Water Hickory* (34)
Fruit a nut with a green hull that does not split away.
Hull of nut with sticky hairs..... *Butternut* (25)
Hull of nut without sticky hairs.. *Black Walnut* (26)

B. Leaves compound, opposite on the twig.
Leaflets clustered at the end of the leaf-stalk (palmately compound) ..... *Buckeye* (133)
Leaflets not clustered at the end of the leaf-stalk (pinnately compound).
Leaflets not lobed; fruit simple with an apical wing.
Fruit averaging 2 inches or more long; a tree of the coastal swamps..... *Pumpkin Ash* (156)
Fruit less than 2 inches long.
Wing narrow, linear, extending about half way down the narrow seed... *Darlington's Ash* (157)
Wing spatulate, broad, extending about half way down the long narrow seed.
Twigs and leaf-stalks velvety..... *Red Ash* (155)
Twigs and leaf-stalks smooth..... *Green Ash* (155)

Wing broad, extending more than half way down the short plump seed ..... *Small's Ash* (158)
Wing long, narrow, pointed or notched, not extending down the short plump seed.
Twigs and leaf-stalks smooth..... *White Ash* (153)
Twigs and leaf-stalks tomentose.. *Biltmore Ash* (154)
Wing broad, extending all around the seed; a tree of the coastal swamps *Water Ash* (159)
Leaflets, at least some of them, lobed; fruit double, with two wings..... *Ash-leaved Maple* (132)

C. Leaves simple, alternate on the twig.
Fruit not an acorn. (For "Fruit an Acorn" see page 16.)
1. Branches thorny.
Edges of leaves not toothed or lobed..... *Osage Orange* (p. 52)
Edges of leaves with teeth or lobes.
Fruit ¾ inch or more thick.
Leaves at least twice as long as broad ..... *Narrow-leaved Crab* (88)
Leaves nearly as broad as long..... *Crab Apple* (89)
Fruit not ¾ inch thick.
Leaves three-lobed.
Leaves about twice as long as broad, acute at base..... *Green Haw* (94)
Leaves about as broad as long, not acute at base..... *Washington Thorn* (102)
Leaves deeply cut with more than three lobes ..... *Parsley Haw* (100)
Leaves not deeply lobed.
Nutlets with cavities on their inner faces.
Fruits globose ..... *Chapman's Thorn* (103)
Fruits pear-shape ..... *Pear Thorn* (104)
Nutlets without cavities on their inner faces
Leaves about twice as long as broad.
Leaves small, mostly less than one inch wide.
Leaves dark shiny green above, smooth, toothed on upper half; fruit nearly ½ inch in diameter..... *Cock-spur Thorn* (90)

Leaves as above, but hairy; fruits slightly hairy, about ⅜ inch in diameter *Barberry-leaved Haw* (91)
Leaves similar to above, or three-lobed on vigorous shoots, hairy when young; fruits about ¼ inch in diameter ..... *Spatulate Thorn* (99)
Leaves larger, mostly over an inch wide.
Leaves dull above; fruits short oblong, ½ inch in length, white dotted .... *Dotted Thorn* (92)
Leaves dull above, fruits globose, one-third to one-half inch in diameter, pale dotted ..... *Chapman's Hill Thorn* (93)
Leaves shining above, often three-lobed; fruits globose, ¼ inch or less in diameter ..... *Green Haw* (94)
Leaves about as broad as long.
Flower-stalks smooth.
Leaves half leathery; fruits about ½ inch in diameter *Boynton's Thorn* (95)
Leaves thin; fruits about ½ inch in diameter, with a more or less waxy bloom *Waxy Thorn* (101)
Flower-stalks hairy.
Fruit pear-shape, about ½ inch long ..... *Summer Haw* (96)
Fruit globose, ¼-½ inch in diameter, marked with dark dots ..... *Sunny Thorn* (98)
Fruits globose, about ½ inch in diameter, not dotted ..... *Rough Thorn* (97)

2. Branches not thorny.
a Edges of leaves not toothed or lobed.
x Leaves evergreen.
Leaves averaging less than 2½ inches broad.
Leaves aromatic when bruised.
Twigs smooth.
Twigs light green, leaves white beneath ..... *Sweet Bay* (76)
Twigs brown, leaves light beneath ..... *Smooth Red Bay* (80)

Twigs hairy ..... *Red Bay* (81)
Leaves not aromatic when bruised.
Twigs smooth.
Leaf broadest near the outer end *He Huckleberry* (117)
Leaf broadest near the middle... *Laurel Cherry* (109)
Twigs hairy.
Leaves over 3½ inches long.... *Rhododendron* (148)
Leaves less than 3¼ inches long.
Twigs sticky when young and becoming smooth in latter part of season; fruit a pod *Mountain Laurel* (149)
Twigs not sticky; leaves often with prickly edges; fruit a berry..... *Dahoon Holly* (120)
Leaves averaging more than 2½ inches broad. *Magnolia* (75)

y Leaves not evergreen.
Leaves large, averaging over 5 inches long.
Leaves not bad smelling when crushed.
Leaves not eared at the base.
Over 12 inches long..... *Umbrella Tree* (71)
Less than 12 inches long..... *Cucumber Tree* (74)
Leaves eared at the base.
Over 18 inches long..... *Learge-leaved Cucumber* (73)
Less than 18 inches long..... *Mountain Magnolia* (72)
Leaves bad smelling when crushed.. *Pawpaw* (78)
Leaves averaging less than 5 inches long.
Blade of leaf as broad or nearly as broad as long ..... *Redbud* (111)
Blade of leaf much longer than broad.
Fruit a persimmon ..... *Persimmon* (150)
Fruit a blue or black berry with large stones.
Veins from mid-rib strongly curving toward tip..... *Blue Dogwood* (142)
Veins from mid-rib not strongly curving toward tip.
Fruits usually 3 on a common stem ..... *Black Gum* (143)
Fruits two on a common stem *Water Gum* (144)
Fruits one to the stem; leaves sometimes toothed ..... *Tupelo Gum* (145)

b. Edges of leaves with teeth or lobes.
  x Blade of leaf as long as broad or less than twice longer than broad.
    Blade of leaf broad and notched at the end ..... *Tulip Tree, "Poplar"* (77)
    Blade of leaf pointed at the end.
      Fruits on a leaf-like bract.
        Leaf green beneath ..... *American Linden* (135)
        Leaf gray and moderately tomentose beneath with short hairs; bracts mostly abruptly narrowed at the base and under 4 inches long ..... *White Linden* (136)
        Leaf silvery and densely covered beneath with short hairs; bracts usually tapering at the base and mostly over 4 inches long..... *Michaux's Linden* (137)
        Leaf rusty beneath with short hairs ..... *Downy Linden* (138)
      Fruits not on a leaf-like bract.
        Leaves five-lobed, smooth and shining ..... *Sweet Gum* (83)
        Leaves large with many irregular lobes and teeth; bark white, flaky ..... *Sycamore* (84)
        Not as above.
          Blade six inches or more long, not lobed ..... *Cotton-wood* (23)
          Blade smaller or deeply lobed.
            Leaf-stalks not flattened.
              Leaves smooth on both sides; fruit white ..... *White Mulberry* (p. 52)
              Leaves more or less tomentose below, harsh above; not increasing by suckers *Red Mulberry* (70)
              Leaves densely soft, tomentose below, harsh above; increasing by suckers.... *Paper Mulberry* (p. 52)
            Leaf-stalks flattened below the blade.
              Leaves white tomentose beneath ..... *White Poplar* (p. 30)
              Leaves smooth, teeth large, less than 14 on each side *Large-toothed Poplar* (24)
              Leaves smooth, teeth small, more than 14 on each side ..... *Carolina Poplar* (22)

y Blade of leaf much longer than broad.
Leaves evergreen, thick and leathery.
Edges of leaves prickly.
Leaves less than twice as long as broad ..... *American Holly* (118)
Leaves more than twice as long as broad ..... *Dahoon Holly* (120)
Edges of leaves not prickly.
Leaves averaging less than 2 inches long ..... *Yopon Holly* (119)
Leaves averaging more than 2 inches long
Fruit a red berry..... *Dahoon Holly* (120)
Fruit a silky pod..... *Loblolly Bay* (139)
Leaves not evergreen.
Teeth of leaves with bristle tips.
Leaves white tomentose beneath... *Chinquapin* (42)
Leaves not tomentose beneath.... *Chestnut* (41)
Teeth of leaves not bristle tipped.
Leaves over 5 times as long as broad.
Branchlets drooping ..... *Weeping Willow* (p. 28)
Branchlets not drooping.
Leaves green beneath ..... *Black Willow* (20)
Leaves whitish beneath ..... *Ward's Willow** (21)
Leaves less than 5 times as long as broad.
Leaves with conspicuous parallel veins from the mid-rib to the edge.
Bark smooth or with only slight furrows and cracks.
Leaf margin undulate..... *Witch Hazel* (82)
Leaf margin smooth or minutely toothed ..... *Buckthorn* (134)
Leaf margin distinctly toothed.
Bark whitish, trunk without ridges ..... *Beech* (40)
Bark very dark, trunk with ridges ..... *Hornbeam* (36)
Bark quite rough or papery.
Leaves and young bark with odor of wintergreen.
Bark whitish, peeling off in papery layers ..... *Yellow Birch* (39)
Bark not white or papery *Cherry Birch* (38)†

* The leaves of the Silky Willow, which is only a shrub, are also whitish beneath and must not be confused with this.

† See also *B. alleghanensis* (p. 36).

Leaves and bark not aromatic.
Bark falling away in papery layers, brownish... *River Birch* (37)
Bark rough-scurfy; fruit a cluster of hop-like bracts ..... *Hop-Hornbeam* (35)
Bark rough; fruit small, flat, winged.
Leaves averaging less than 2½ inches long *Winged Elm* (68)
Leaves averaging more than 2½ inches long.
Soft velvety below, rough above; wing of fruit not hairy *Slippery Elm* (66)
Smooth or nearly so above, smooth or tomentose below; wing of fruit hairy *White Elm* (67)

Leaves without conspicuous parallel veins from the mid-rib to the edge.
Leaves without teeth, generally, but not always, lobed; aromatic ..... *Sassafras* (79)
Leaves toothed but not lobed.
Leaves distinctly sour to the taste ..... *Sourwood* (146)
Leaves distinctly sweet to the taste ..... *Horse Sugar* (151)
Leaves not distinctly sour or sweet.
Leaves with coarse teeth like a saw, ovate-lanceolate; bark with thick, corky warts ..... *Hackberry* (69)
Leaves oval, downy below; fruit four-winged *Snowdrop Tree* (152)
Leaves ovate to obovate, rather abruptly pointed; fruit a bitterish plum ..... *Wild Plum* (107)
Leaves long-lanceolate; fruit a sweet plum... *Chickasaw Plum* (108)
Leaves oblong-lanceolate, about 3 times longer than broad; fruit a small red cherry ..... *Wild Red Cherry* (106)

Leaves oval to lanceolate, about twice longer than broad; fruit a small black cherry ..... *Choke Cherry* (105)
Leaves obovate-lanceolate, less than an inch broad; fruit a small red berry ..... *Deciduous Holly* (121)
Leaves ovate-lanceolate, with a long point, more than 1¼ inches broad; fruit a small red berry *Mountain Holly* (122)
Leaves small, ovate, shiny, thick, with minute teeth on the turned under edges; fruit small, black ..... *Sparkleberry* (147)
Leaves ovate, tapering to a point, bronze when young, smooth beneath at maturity, teeth small and very close; fruit small, reddish ..... *Shad-bush* (87)
As above, but leaves tomentose at maturity and not bronze when young ..... *Swamp Shad-bush* (86)

Fruit an acorn.
Leaves broadest at the ends.
Two or three inches long..... *Water Oak* (61)
Four to six inches long..... *Black Jack Oak* (60)
Leaves broadest in the middle.
Leaves usually without lobes.
Leaves evergreen.
Leaves white-tomentose beneath, leathery ..... *Live Oak* (51)
Leaves smooth beneath ..... *Laurel Oak* (63)
Leaves not evergreen.
Smooth and shining on both sides ..... *Willow Oak* (62)
Tomentose beneath, averaging over an inch wide..... *Shingle Oak* (64)
White tomentose beneath, rarely an inch wide..... *Upland Willow Oak* (65)
Leaves with lobes.
Lobes not bristle tipped.
Lobes less than ten.

Lobes rounded, cup of acorn low.
Leaves with seven or nine regular lobes, whitish beneath.
Acorns on short stalks... *White Oak* (43)
Acorns on long stalks.... *Swamp White Oak* (49)
Leaves with five to seven deep, irregular, rounded lobes, gray-green beneath.
Leaves averaging under 3 inches long ..... *Scrubby Post Oak* (45)
Leaves averaging over 3 inches long ..... *Post Oak* (44)
Lobes pointed, cup almost covering acorn ..... *Overcup Oak* (46)
More than 15 shallow lobes.
Acorn an inch or more long.
Upland tree ..... *Rock Chestnut Oak* (48)
Low-ground tree ..... *Swamp Chestnut Oak* (47)
Acorn less than ¾ inch long.. *Yellow Chestnut Oak* (50)
Lobes bristle tipped.
Mature leaves green on both sides.
Cup of acorn very low.
Lobes of leaf shallow, acorn large ..... *Red Oak* (52)
Lobes of leaf deep; acorn about ½ inch long..... *Pin Oak* (55)
Lobes of leaf deep; acorn more than ½ inch long.. *Swamp Red Oak* (54)
Cup of acorn deep, about half the length of the acorn.
Leaf-stalk less than an inch long ..... *Turkey Oak* (59)
Leaf-stalk more than an inch long.
Edge of cup usually inrolled, scales tightly pressed together; leaves smooth and shining on both sides ..... *Scarlet Oak* (53)
Edge of cup not inrolled, scales loosely pressed together; leaves dark-green, under side yellow-scurfy when young, but becoming smooth.. *Black Oak* (56)

Mature leaves densely tomentose beneath.
Upland tree; leaf usually with a long central lobe, base of leaf rounded ..... *Spanish Oak* (57)
Low-ground tree; base of leaf pointed ..... *Swamp Spanish Oak* (58)

D. Leaves simple, opposite on the twig.
a Edges of leaf not toothed or lobed.
Leaves heart-shaped, large.
Fruit a short, ovate pod..... *Paulownia* (p. 97)
Fruit a long, slender pod..... *Catalpa* (162)
Leaves not heart-shaped.
Leaves with minute white hairs on both sides; each group of small, yellow flowers surrounded by four white, petal-like leaves ..... *Dogwood* (141)
Leaves without hairs on the upper side; flowers in loose, drooping clusters, fragrant, petals long and narrow.... *Fringe Tree* (160)
Leaves without hairs on the upper side; flowers in broad, erect clusters, petals short ..... *Withe Rod* (165)
Leaves without hairs, evergreen; flowers in axillary clusters, fragrant.... *Devil-wood* (161)
b Edges of leaves with teeth or lobes.
Leaves not lobed, toothed.
Peduncles (common stalks of the fruit and flower clusters) ½ inch or more long ..... *Withe Rod* (165)
Peduncles less than ½ inch long.
Twigs and leaf-stalks smooth..... *Black Haw* (163)
Twigs and leaf-stalks sparingly red-hairy or scurfy (scaly), mountain tree ..... *Nanny Berry* (166)
Twigs and leaf-stalks covered with red plush, middle and eastern tree *Blue Haw* (164)
Leaves lobed and strongly toothed.
Small trees of the high mountains; fruit in terminal racemes.
Bark striped with whitish lines..... *Striped Maple* (130)
Bark not striped with whitish lines.. *Mountain Maple* (131)
Small shrub or tree of the Piedmont; bark very white; leaves not whitish beneath ..... *White-barked Sugar Maple* (12
Larger trees; fruits in lateral clusters.
Leaves deeply lobed more than half way to the middle, coarsely toothed, silvery white below ..... *Silver Maple* (123)

Leaves with 3-5 lobes which extend less than half way to the middle, many teeth, whitish below; fruit red.
Leaves small, three-lobed, tomentose below ..... *Carolina Red Maple* (125)
Leaves larger, 3-5 lobed, smooth below ..... *Red Maple* (124)
Leaves with 3-5 strong lobes, which have only 2-4 teeth or none.
Leaves whitish, smooth beneath.. *Sugar Maple* (126)
Leaves whitish, tomentose beneath *Southern Sugar Maple* (127)
Leaves green beneath, lobes scarcely toothed ..... *Black Maple* (129)

GYMNOSPERMS

PINE FAMILY
(CONIFERAE)

1. Pinus echinata Mill. Rosemary Pine, Short-leaf Pine, Yellow Pine.

Needles short, 3-5 inches long, not twisted; cones very small, 2 inches long or less. The largest North Carolina pine and an important timber tree; abundant in the middle district where it covers old fields, and is often known as Old Field Pine; much rarer in the coastal plain where it descends to the neighborhood of streams or damp flats; in the mountains it is found only at low elevations. Old trees grown in thick woods are free of limbs and knots to near the top, and such trees are commonly called Forest Pines. "Lone Pine," the very large tree on Lone Pine Hill, destroyed by lightning about 1908, was probably the largest pine tree in Orange County; from the rings it was about 203 years old. Dates of flowering: April 15, 1903; April 22, 1909; April 4, 1910.

2. Pinus Taeda L. Loblolly Pine, Old Field Pine, North Carolina Pine.

A large tree with needles about six inches long, and cones 3-5 inches long. Abundant in the coastal plain and eastern part of the middle region, where it covers old fields and is replacing the Long Leaf Pine in good land, then decreasing rapidly and disappear-

ing at the foot of the mountains. Mr. J. S. Holmes,* State Forester, estimates that the Loblolly comprises about 20% of our pines in the neighborhood of Chapel Hill, but that even at Hillsboro it drops to 15%. "Queen of Pines," the large tree near the Meeting of the Waters branch, belongs to this species. Dates of flowering: April 2, 1903; April 4, 1908; April 6, 1909; April 2, 1913; April 23, 1915; April 14, 1916.

3. Pinus virginiana Mill. Scrub Pine, Jersey Pine, Spruce Pine.

A small tree with almost smooth bark, drooping branches, short, twisted needles, about 1¾-2½ inches long, and very small and abundant cones about 1½-2 inches long. Abundant on dry hills and bluffs from Orange County westward to the lower mountain ridges. In the neighborhood of Chapel Hill it is found only on very poor or hilly places, as near King's Mill, where it forms groves on both sides of Morgan's Creek, on bluffs of Castleberry's farm, on Rocky Ridge Farm, etc. It is found sparingly in such places as far east as Wilmington. Dates of flowering: about April 2, 1903; April 22, 1914; April 16, 1916.

4. Pinus pungens Michx. Table Mountain Pine, Burr Pine.

Leaves two in a bundle, strong, about 1½-2½ inches long; cones heavy, about 3 inches long, re-

* Holmes, J. S., Timber Resources of Orange County, N. C. Geological and Economic Survey, Press Bulletin 116, 1914.

markable for the very broad and strong spines with bent tips. Thomas Meehan reports that trees of this pine grow well from old cones and that even clean seeds survive for as much as six years (Bot. Gaz. 5:75. 1880). A small or medium sized tree of irregular growth, found only in poor soil in the Blue Ridge mountains and on ridges east of them, as on Pilot Mountain.

5. Pinus rigida Mill. Black Pine, Pitch Pine, Mountain Pine.

Leaves usually in threes, rarely in fours, 3-4½ inches long; cones resembling those of the Short-leaf Pine but larger, about 2-2½ inches long. A rather small tree that is common in the mountains, extending into the adjacent Piedmont, as far east as Lincoln and Yadkin Counties; usually knotty and not of much commercial importance.

6. Pinus serotina Michx. Pond Pine.

A good sized tree with exactly the appearance of *P. Taeda,* except for the cones which are broadly top-shaped, solid, about 2-2¾ inches long and of the same width when open. They remain closed usually for several years and sometimes for as much as 12 years, and in these closed cones the seeds remain capable of germination. (See Coker, Jour. Elisha Mitchell Soc. 26:43. 1910). Common in swamps of the coastal plain and occasional in the eastern part of the middle district to the eastern part of Alamance County. It is not known to occur in Orange County.

7. Pinus palustris Mill. Long-leaf Pine.

This well known and very valuable timber and turpentine pine has been in great measure destroyed in our state. Leaves in threes, ten to fifteen inches long; cones very large, six to nine inches long, appearing in abundance only at intervals of several years. It is confined to the coastal plain and adjacent areas as far west as Cary in Wake, and Troy in Montgomery Counties. The young trees stand fire well, and with slight protection would soon recover a large part of their original habitat. The Loblolly Pine (*Pinus Taeda*) is now largely taking its place.

8. Pinus Strobus L. White Pine.

Needles delicate bluish-green, borne in groups of five or rarely more; branches smooth, cones long and slender, with thin scales. This beautiful and valuable pine is found principally in the mountains, but occurs as far east as Davie County. In addition to its great importance as a timber pine, it is much used as an ornamental tree in cultivation.

9. Picea mariana (Mill.) B S P. Black Spruce.

This is a fine, large tree of the mountains, making up a large part of the Balsam groves of Grandfather, Mitchell, Clingman, the Black Mountains, etc., and often called "He Balsam." It is usually mixed with the true Balsam or Fraser's Fir, from which it can be easily distinguished by its squarish leaves extending in all directions around the twigs, and by the

smaller pendant cones, which are about 7/8-1¼ inches long, and persist for several or many years. The Black Spruce is now being extensively lumbered and shipped out over railroads that have recently been extended up the mountain sides.

10. Picea rubens Sargent. Red Spruce.

This tree is very rare and small in our state and is reported only from a few mountain swamps. It is distinguished from the Black Spruce by the larger cones, $1^3/_{16}$-2 inches long, which fall early, and by the leaves not being glaucous.

11. Abies Fraseri (Pursh) Poir. Balsam, Frasers' Fir.

This is the true Balsam of the highest mountains. Leaves fragrant, narrow, flattish, white below at least when young; cones 2-3 inches long, standing upright on the branches near the top of the tree. Here and there in the bark are large blisters filled with clear liquid resin, which may be used as a healing lotion to cuts and for other uses to which Canada Balsam (obtained from *A. balsamea*) is put. This species does better in cultivation in the Southern States than *A. balsamea,* and retains its beauty longer.

12. Tsuga canadensis (L.) Carr. Hemlock.

Needles short, flat, about ½ inch long, with two white streaks beneath; cones small, about 5/8-1 inch long. This fine Hemlock is plentiful in good moist soil in the mountains, and is important for

timber and for tan-bark. It is supposed to be confined to the mountains, but was reported over thirty years ago by Dr. J. A. Holmes from one place in Wake County on a northward-facing bluff of Swift Creek at an elevation of not more than 350 feet (Jour. Mitchell Soc. 1:86. 1883-84). We have recently visited this mountain-like bluff known as "Spruce Pine Hill," about ten miles southwest of Raleigh and one mile west of the Holly Springs road, and found there six or seven rather large trees, also several young plants, and all in good health.

13. Tsuga caroliniana Englm. Carolina Hemlock.

This is a smaller tree than the Canada Hemlock, and is less abundant and with different habitat, being found only on dry slopes at moderate elevations, as on Pinnacle Mtn. (near Kanuga), Banner's Elk, Linville Gorge, etc., extending north a little way into Virginia. It also differs from the above in having the leaves pointing in all directions around the twig, in the somewhat larger cones, about 1½ inches long, with longer scales, and in the less spreading growth. It is fine in cultivation.

14. Taxodium distichum (L.) Richard. Swamp Cypress.

A large and important timber tree of the coastal plain swamps, with very durable wood which is highly valued for shingles and other exposed construction. The leaves are flat, narrow, and spreading in one plane on slender short branches that fall with the

leaves in autumn. The cones are spherical, about ¾ inch in diameter, and with thick scales which bear two seeds each. Though confined to the swamps, this cypress and the next will do well in any good upland soil, and are very ornamental.

15. Taxodium ascendens Brongniart. Pond Cypress.

This tree inhabits savannas and poorly drained bogs, and is usually smaller than the preceding, from which it may be distinguished by the leaves being shorter and pressed against the twigs, although strong sprouts often have the leaves spreading. The bark is also more coarsely ridged and thicker in this species.

16. Chamaecyparis thyoides (L.) B S P. Juniper.

This is the Juniper of the coastal plain swamps, with scale-like leaves and very small dry cones about the size of a pea. It has great value for telephone and telegraph poles.

17. Thuja occidentalis L. Arbor-vitae.

This is about the rarest tree in North Carolina, and is scarcely more than a shrub here. It is said to occur in only a few places, as on Cripple Creek and Linville River, on limestone soil. The leaves are minute and scale like, and the cones small and elongated, about ⅜-½ inch long.

18. Juniperus virginiana L. Red Cedar.

The only cedar of tree size in our state; in shape usually narrowly pyramidal, but in Chapel Hill usu-

ally open and spreading. The color is also quite variable, some being decidedly bluish-green. The cedar is common in the middle district, but rare on the coastal plain except near the sea, and is absent in the mountains except at low elevations. Dates of flowering of the male trees: about March 1, 1903; March 2, 1908; March 15, 1912; January 25, 1913; February 2, 1914; February 12, 1915; January 29, 1916. The male trees begin flowering first, and sometimes the flowering of the female tree is delayed by the return of cold weather, e. g., March 16, 1914; March 25, 1915. For the years 1915 and 1916 practically all of the pollen was shed before the female trees bloomed, and although they formed the normal-looking blue berries with seeds of usual size, the seeds were empty and worthless.

ANGIOSPERMS

MONOCOTYLEDONS

PALM FAMILY
(PALMAE)

19. Sabal Palmetto (Walt.) R. & S. Palmetto.

The semi-tropical palmetto with large fan-like leaves at the top of the thick stems, is found on Smith's Island at the mouth of the Cape Fear River where it is said to reach a height of thirty feet. This is its northern limit.

DICOTYLEDONS

WILLOW FAMILY
(SALICACEAE)

20. Salix nigra Marsh. Black Willow.

The common small tree along branches and creeks with dark bark and light green delicate foliage; leaves long, narrow, and somewhat curved, finely toothed on the margin, smooth and shining on both sides. The delicate light green foliage of this willow can be used to fine effect in landscape work. Dates of flowering: April 14, 1903; April 3, 1908; April 7, 1909; April 5, 1910; April 15, 1913; April 22, 1915; April 14, 1916.

21. Salix Wardii Bebb. Ward's Willow.*

A small tree or shrub much like the Black Willow, but the leaves are light bluish green beneath, sometimes hairy beneath; found along rocky and gravelly banks of streams. Its distribution has not been properly worked out in this state as it has usually been confused with the Black Willow. Small reports it as growing at the Falls of the Yadkin River as an almost prostrate shrub, forming large tangled mats, seldom rising more than six inches above the ground. (Bull. T. B. C. 24:61. 1897).

* The well known weeping willow (*Salix babylonica* L.) is occasionally spontaneous where the branches happen to be thrown, and Dr. Britton reports the White Willow (*S. alba* L.) as naturalized in North Carolina. The latter can be recognized by its tree size and whitish, silky leaves.

22. Populus deltoides Marsh. Carolina Poplar or Cotton-wood.

Leaves heart-shaped, large 4-7 inches long, and nearly or quite as broad, smooth and shining on both sides, with many rounded teeth, drooping and trembling, on long leaf-stalks; bark rather smooth and light; fruit a small, pointed pod with silky-hairy seeds. The Carolina Poplar is given by Pinchot and Ashe as appearing in the Piedmont Plateau and they do not refer it to any other section of the state, but Curtis says it is abundant in the lower sections of the Southern States. According to our observations it is most common in the coastal plain, and enters sparingly into the Piedmont. It is wild in swamps near Charlotte (Brier Creek), but has not been found in Orange County. This is the poplar that is so much planted for quick effect in streets and lawns. It is short-lived and easily broken, and should give place to better kinds.

23. Populus heterophylla L. Cotton-wood.

A tall, fine tree of the deep swamps in the coast region, at present certainly known only from the lower Cape Fear, and from Pender County, but probably present in similar swamps in many other places in the eastern half of the state. Leaves ovate with long points, 6-8 inches long, and about 4-5 inches wide, heart-shaped at the base, regularly toothed, densely coated below with long tawny down when young, becoming less downy in age.

24. Populus grandidentata Michx. Large-toothed Poplar.*

A medium sized tree of cool rich soil in the upper part of the Piedmont section; not common. Leaves about 3-4 inches long and 2-3 inches wide, with distant, blunt teeth, very deep green above, light green below, smooth after maturity and not shining. When unfolding the leaves are white tomentose below. The very deep green foliage and thrifty appearance of this poplar make it valuable to give variety in decorative plantings.

WALNUT FAMILY
(JUGLANDACEAE)

25. Juglans cinerea L. White Walnut, Butternut.

Usually a small tree, rarely of good size, scattered in damp bottoms and by streams in the mountains at lower elevations, and in the upper Piedmont. Curtis says that he has not met with it east of Wilkes, but that he was informed that it was occasionally found as far down as Orange and Randolph. We have not seen or heard of it in Orange. The large leaves are compound with 11-17 leaflets, and the leaf-stalks and twigs are very sticky. The edible nut is about twice as long as wide, and when the hull is removed, is seen to be covered with thin, sharp plates.

* The European White Poplar (*Populus alba* L.), with whitish bark, and leaves with dense white tomentum beneath, has the habit of forming suckers freely and often establishes itself along roadsides and in old fields, sometimes forming dense patches. It should not be planted as it may quickly become a nuisance. Examples: along Rosemary Street, near Prof. T. J. Wilson's house.

26. Juglans nigra L. Black Walnut.

A large, well known, and very valuable timber tree, with a spherical, rough nut enclosed in a thick, warty, unopening hull. Sparsely scattered through old fields and rich woods throughout the state except in the high mountains, and is most common in the middle section. Handsome in cultivation, but the leaves appear very late and drop very early. Dates of flowering: May 13, 1903; May 3, 1913; May 3, 1916.

27. Hicoria ovata (Mill.) Britton. Scaly-bark or Shell-bark Hickory.

A well known and valuable timber tree of low grounds that is scattered over the whole state except in the higher mountains; most plentiful in the middle section. It is easily recognized by its flaky bark, very large, hairy leaves, with usually five leaflets, and four-sided, sweet nuts with thin shells and thick hulls. Examples: trees in swamp of Bowlin's Creek below Handcock's bridge.

28. Hicoria carolinae-septentrionalis Ashe. North Carolina Scaly-bark or Southern Shell-bark Hickory.

A tree with flaky bark found in low grounds and sparingly on hills from Orange County to the foot of the mountains. It differs from *H. ovata* in its small, smooth leaves and thinner hull of nut. The nut may be like that of *H. ovata* or less ridged. Examples: Tree by Morgan's Creek at Scott's Hole and

trees on top of hill, edge of woods north of King's Mill dam.

29. Hicoria microcarpa (Nutt.) Britton. Small-fruited Hickory.

A tall and rather narrow tree that is sparingly scattered in upland woods from Orange to Caldwell Counties so far as now known; bark usually flaky, sometimes hardly flaky in lower half of tree; nuts flattened-ovate, thin-shelled, sweet, a large per cent wormy with a hole in the side; hull thin, tardily dehiscing. In the spring this species is easily distinguished from all others by the late swelling of the buds, which are just breaking when *H. ovata* is in flower. Main terminal buds small and ridged by 3-5 thickened scales that fall off during the winter. Dates of flowering: April 8, 1911; April 18, 1912; April 23, 1916. Examples: tree by street at end of Dr. Lawson's tennis court; tree in southwest corner of lawn at "The Rocks."

30. Hicoria glabra (Mill.) Britton. Pig-nut Hickory.

A small or good sized upland tree of poor soil, occurring plentifully in the middle section, frequently in the coastal plain, and occasionally in the mountains. It has low-ridged bark and a nearly ovate, thick-shelled nut with a hull that does not open at all or only partially, and is usually furnished with a neck at the base; leaves broader and more noticeably toothed than in *H. microcarpa;* buds like those of *H. microcarpa.* In Chapel Hill we have a form of

this tree with flaky bark, as the one by path to the Country Club house. Dates of flowering: May 5, 1903; April 25, 1909; April 13, 1910. Example: tree near Dr. Battle's office.

31. Hicoria pallida Ashe. Pale Hickory.

A scattered tree of upland woods in the Piedmont section and of valleys in the coastal plain, with open spreading crown and pale, delicate foliage; leaflets 5-7, narrow, the lower much smaller, covered below with minute peltate scales which give them a silvery appearance when young. The small, smooth buds and the hull of the globular or ovate nut are conspicuously yellow with minute granular scales. The delicate foliage and widely spreading crown of this tree make it one of the most decorative of all our hickories. Its shape is in strong contrast to the shaft-like habit of most of the other species. In Chapel Hill it reaches a height of about 60 feet and a circumference of 8 feet, 7 inches, two feet from the ground. Dates of flowering: May 8, 1911; April 18, 1912; April 25, 1916. Examples: tree on west side of President's yard; tree near the Law building.

32. Hicoria alba (L.) Britton. White-heart Hickory.

Our most common hickory, occurring plentifully throughout the state, and highly valued for its strong, tough wood. A tall, short-limbed tree with light, ridged bark, and large, hairy, strong-scented leaves that turn a beautiful yellow in the fall; bud large

with thickened outer bud-scales which fall during the winter, leaving it smooth and velvety. Hull moderately thick, splitting away from the nut which is thick-shelled and very variable in size and shape. Dates of flowering: about April 5, 1903; April 16, 1909; April 7, 1910; April 7, 1913; April 18, 1916. Example: tree on campus in front of the Alumni Building.

33. Hicoria cordiformis (Wang.) Britton. Bitter-nut Hickory.

A tree of low grounds, named for its very bitter nut; bark low-ridged; leaves small and slightly hairy; buds and young fruits covered with small yellow scales, not noticeable on the mature fruit; nut globose to ovate with a rather long beak at the stigma end, hull and shell very thin. In this state it is common in the mountain valleys and Piedmont swamps, but is rare in the coastal plain, and seems to be absent in the sand hill region. Date of flowering: May 19, 1914. Example: tree by Morgan's Creek at northeast end of Scott's Hole.

34. Hicoria aquatica (Michx. f.) Britton. Water Hickory.

A large fine tree confined to deep swamps in the eastern part of the coastal plain. Leaflets 7-13, narrow, smooth; nut flattened, reddish, very rough, shell thin, kernel very bitter. Distinguish from the Bitter-nut by the more numerous leaflets and very different nut.

BIRCH FAMILY
(BETULACEAE)

35. Ostrya virginica (Mill.) K. Koch. Hop Hornbeam.

A small tree found along the edges of low grounds and on rocky river banks in the Piedmont from Orange County westward, and in good soil in the mountains to an elevation of 5200 feet. Not nearly so plentiful as the next. Bark scurfy-scaly; leaves elm-like; fruit a hop-like cluster of bracts each enclosing a little nut; wood very hard and tough, useful for mallets, wedges, cogs, levers, etc. Dates of flowering: March 25, 1903; April 1, 1909; April 16, 1916. Examples: small trees at edge of low grounds, by road to Scott's Hole.

36. Carpinus caroliniana Walt. Hornbeam or Ironwood.

A small crooked tree with ridged trunk and close, hard bark, common along streams and in rich woods in the middle and western parts of the state, less common and retiring to deeper swamps in the coastal plain. Leaves elm-like, doubly toothed; fruit a small nut at the base of a leaf-like bract; wood very hard and used for the same purposes as the above. Dates of flowering: March 20, 1903; March 28, 1910; April 2, 1912; April 15, 1915; April 5, 1916. Examples: trees along Battle's branch.

37. Betula nigra L. River Birch, Black Birch.

A common tree along creeks and rivers in the Piedmont and along larger rivers in the coastal plain and

in the mountains. It is easily recognized by its habitat, by the reddish bark which peels off in thin papery layers, and by the pale and tomentose under-surface of the leaves. Dates of flowering: about April 5, 1903; April 2, 1908; April 17, 1915; April 15, 1916. Examples: trees by Scott's Hole.

38. Betula lenta L. Cherry Birch, Black Birch.

A fine tall tree confined in this state to cool rich soil in the mountains. It may be easily distinguished from the River Birch by its place of growth, the smooth cherry-like bark, and by the strong odor of wintergreen. The leaves are bright green above, usually heart shaped at base and slightly downy on the veins beneath. The wood is strong, hard, dark in color and takes a fine polish.

39. Betula lutea F. A. Michx. Yellow Birch.*

This birch is confined to the high mountains. It may be distinguished from the Cherry Birch by the silvery or yellowish bark, which scales off in large and very thin papery sheets. The leaves are dull green above and downy on the veins beneath, the base not heart-shaped or slightly so. The wood, like that of the Cherry Birch is highly valued for the manufacture of furniture.

* There is a tree somewhat intermediate between the Cherry Birch and the Yellow Birch, that is considered distinct by Dr. Britton, and given the name of *Betula alleghanensis* by him. The leaves are mostly cordate like those of the Cherry Birch, but the scales of the fruit are hairy while those of the latter are smooth. It resembles the Yellow Birch in the hairy scales, but differs in the cordate leaves. The bark is said to be either close and furrowed or to peel off in thin yellowish layers. If really distinct, it is difficult to determine with certainty by the beginner.

BEECH FAMILY
(FAGACEAE)

40. Fagus grandifolia Ehrh. Beech.

A tree of rich low woods, mostly along brooks and creeks, with the light, smooth bark usually marked with initials, hearts and dates; buds slender, sharp pointed; fruit nearly globular, with short slender prickles, containing one or two small, angular, shining nuts. It extends from the coast to the tops of the high mountains, reaching its greatest size in the rich mountain valleys. It is practically absent in the Sand Hill region. The coastal form is separated in Gray's Manual, 7th ed., as var. *caroliniana* (Land.) Fernald & Rehder. Date of flowering: April 31, 1903. Examples: trees along Battle's branch.

41. Castanea dentata (Marsh) Borkh; Chestnut.

A large forest tree of the mountains and hills with the large nuts borne two or three together in a prickly burr; leaves smooth beneath. The chestnut is common in the mountains and is scattered over the western half of the middle section as far east as Guilford and Randloph. Flowers in summer. The wood is durable and is used for cross-ties, posts, and for inferior furniture. The chestnut blight, a virulent disease that has practically destroyed the chestnuts of the northern states, has not yet reached us, but is apt to do so at any time as it is reported from southern Virginia.

42. Castanea pumila (L.) Mill. Chinquapin.

A small tree or shrub of upland hillsides from near the coast to an elevation of about 3000 feet in the mountains. Only one nut is borne in the burr and the leaves are whitish-velvety beneath. Dates of flowering: July 3, 1884; about July 1, 1908; May 25, 1909; May 28, 1916. Examples: trees at top of Lone Pine Hill.

In sandy woods of the lower coastal plain there is a smaller species of Chinquapin (*C. nana* Muhl.), which springs from underground runners. We have found it at La Grange, Lenoir County. It is included in Curtis' list, but is not extended north of Georgia in Small's Flora.

43. Quercus alba L. White Oak.

One of our most common and finest oaks; a large spreading tree with light bark and foliage, light green glabrous leaves with regular rounded lobes, and long ovate acorns of varying size in a shallow cup. In the Piedmont and lower mountains it is very common and is our finest oak, magnificent in cultivation; in the coastal plain it is confined to the neighborhood of creeks and rivers. The wood is very strong and tough and is highly valued for many purposes. In Chapel Hill the white oak reaches a circumference of 18 feet at 5 feet from the ground (Prof. Howell's yard: around the buttressed base, one foot from the ground, this oak measures 29 feet). We have measured the Old Wilson oak at Smith's Grove,

Davie County, and find it to be 21 feet in circumference at five feet from the ground, with a spread of 120 feet. Dates of flowering: April 6, 1903; April 6, 1909; April 1, 1910; April 21, 1915; April 16, 1916.

44. Quercus stellata Wang. Post Oak.

A small, medium sized, or sometimes large tree with a rounded crown; leaves coarse with five large truncate or blunt main lobes, which are usually broadest at the ends, the under side light green and minutely scurfy tomentose, the upper roughish; acorns smaller than those of the White Oak. Abundant in poor soil. The tough and durable wood is used for ties, posts, rails, etc. In Chapel Hill the Post Oak reaches a circumference of 13 ft. 6 inches at 5 feet from the ground (tree southeast of New East Building). Dates of flowering: April 1, 1903; April 16, 1909; April 4, 1910; April 20, 1915; April 15, 1916. Examples: trees near the east gate of campus.

45. Quercus Margaretta Ashe. Scrubby Post Oak.

This is a small tree or often only a shrub occurring in dry, sandy soil in the coastal plain. The leaves are also smaller than in the Post Oak, but the acorns and acorn cups are often larger. Britton gives distinguishing characters as smaller cup than Post Oak and leaves with rounded lobes, but these do not hold in our specimens. The acorns and cups are larger than in our Chapel Hill Post Oaks and the cups are

somewhat more pubescent on both surfaces. The species is very near the ordinary Post Oak, and perhaps should be considered only a sand hill form of that species.

46. Quercus lyrata Walt. Overcup Oak.

An uncommon tree of the low grounds with the acorn almost or entirely covered by the cup; leaves smooth and green or whitish-tomentose on the under side, usually long and narrow with distant, deep, pointed lobes. The Overcup Oak is confined to river bottoms and rich low grounds in the coastal plain and eastern Piedmont, but is absent over large areas. It extends westward to Anson, Chatham, Orange, and Nash Counties, and is plentiful at Chapel Hill. Examples: trees at edge of swamp of Bowlin's Creek, near Handcock's bridge.

47. Quercus Michauxii Nutt. Swamp Chestnut Oak.

A fine large tree of the low grounds of the coastal plain and extending westward through the middle Piedmont. Leaves downy beneath and with many shallow, rounded lobes; acorns large, in a cup with separate scales. Examples: trees at edge of swamp of Bowlin's Creek near Handcock's bridge, also in swamp of New Hope Creek, near Chapel Hill-Durham road bridge where they reach 15 feet in circumference 5 feet from the ground. The wood is valuable for many purposes.

48. Quercus Prinus L.* Rock Chestnut Oak.

Much like the Swamp Chestnut Oak, but differs from it in that it is found only on rocky uplands, and in that the leaves are smoother and the scales of the cup are more or less fused together. It is a much smaller tree than the Swamp Chestnut Oak, and occurs from the high mountains east to Orange, growing scarcer as it descends in the Piedmont. At Chapel Hill it is rare except on the north slope of bluffs. The bark is of value in tanning and the trees are being felled in great numbers to secure it. Date of flowering: April 10, 1903. Examples: tree by tennis court, grove in front of Dr. Battle's, and trees on Laurel Hill.

49. Quercus bicolor Willd. Swamp White Oak.

A large tree of swamps and low grounds in the upper Piedmont and lower mountains; not frequent. The leaves are intermediate in appearance between the White Oak and the Swamp Chestnut Oak, with round shallow lobes, the under surface whitish tomentose. Acorns much like those of the White Oak, but borne on a long stalk, often more than an inch

* The closely related Chinquapin Oak (*Q. prinoides* Willd.) is only a shrub in this state and is rare, occurring in dry soil in the Piedmont and, according to Curtis, also sparingly in the lower district. We have it from Gaston County, near Cherryville. It is much like the Rock Chestnut Oak, but is smaller in every part, the leaf blades averaging only about 2-2½ inches long, and the acorns about ¾ inch long.

In sandy flats around Wilmington and from there southward is found a curious and interesting little shrub called White Oak Runners, or Dwarf Oak (*Quercus pumila* Walt.), which is the smallest species of oak known. It spreads by underground runners and sends up short stems which are from one to two feet high, and which bear acorns abundantly. The leaves and acorns are much like those of the Live Oak.

long, and thus easily distinguished from our other oaks when in fruit.

50. Quercus Muhlenbergii Englm. Yellow Chestnut Oak.

A rare tree that is said to occur in limestone soil along the larger mountain streams of the southern Appalachian mountains (Ayres and Ashe), and Michaux reports a single tree found by him on the Cape Fear River a mile from Fayetteville. It has been collected at Biltmore and at Farmington, Davie County (Biltmore Herbarium). The leaves are lanceolate or obovate, usually narrower than others of this group, with many shallow lobes or teeth, the under side whitish pubescent. The acorns are nearly or quite sessile, only about $^2/_3$ inch long, the cups covering about half of their length.

51. Quercus virginiana Mill. Live Oak.

This beautiful evergreen tree almost reaches its northern limit in North Carolina, passing into Virginia only up to Norfolk, where it is of small size. In this state it occupies a narrow strip of country along the coast and is plentiful only south of Cape Hatteras. The small, evergreen, thick leaves are usually without teeth or lobes, occasionally toothed near the end; acorns oblong, borne on short or long stalks. The Live Oak makes a fine ornamental tree in cultivation, and is hardy and thrifty at least as far west as Chapel Hill. The wood is very tough and is valued in ship building.

52. Quercus rubra L. Red Oak.

A fine tree found abundantly in good soil in the mountains, not rarely near the edges of low grounds and along branches in the Piedmont and very sparingly in similar situations in the coastal plain. Leaves large, broad, smooth, dull, deep green on both sides, with lobes which cut $^1/_3$ to $^2/_3$ the way to the mid rib; acorns very large, at least 1 inch long, in nearly flat cups. A very beautiful tree for the home grounds. This is easily confused by beginners with the Scarlet Oak, but they grow in different places, the acorns are very unlike and the leaves are dull beneath in the Red and shining in the Scarlet Oak. Date of flowering: April 16, 1916. Examples: trees at northwest foot of Lone Pine Hill.

53. Quercus coccinea Muench. Scarlet Oak.

Named from the scarlet color of the leaves in the fall. This is the commonest oak of the mountains and is plentiful on poor rocky hills in the Piedmont. In the coastal plain it is mostly found in the valleys. Leaves deeply cut and shining; acorns varying in size and shape, in a fairly low cup, but not flat like the cups of the Red, Swamp Red, and Pin Oaks, and never reaching the size of Red Oak acorns. Dates of flowering: about April 5, 1903; April 17, 1915; April 16, 1916. Example: tree by field at top of Lone Pine Hill.

54. Quercus Schneckii Britton. Swamp Red Oak.

A large tree of the low grounds with leaves most like those of the Pin Oak, and resembling the Pin Oak in having conspicuous bunches of hairs in the axils of the veins below. The acorns are larger than in the Pin Oak, usually about ¾ inch long, and smaller than in the Red Oak. The Swamp Red Oak is found sparingly from Lincoln to Person Counties and southward. It occurs on Brier Creek near Charlotte, and near Mebane.

55. Quercus palustris Muench. Pin Oak.

A tree of the low grounds with slender branches, the lower ones drooping; leaves small, cut nearly to the mid rib, with conspicuous tufts of hairs in the angles of the larger veins; acorns small, about ½ inch long, flattish, in nearly flat cups. This tree is common farther north, but is very rare in North Carolina, having been reported from this state only from Handcock's bridge ~~and Sparrow's Mill, both~~ on Bowlin's Creek, near Chapel Hill (see Jour. Elisha Mitchell Soc. 30:66. 1914). It is one of the best oaks for use on streets and lawns.

56. Quercus velutina Lam. Black Oak.

A large upland tree with dark bark and dark-green foliage that turns brown in the fall. Leaves broad with shallow or deep lobes, with bristle tips, the under side yellowish scurfy when young, becoming smooth in age; acorn large, about half covered by

the cup. Easily distinguished from others by the reddish inner bark. It is common in the mountains under 2500 feet, abundant in the Piedmont and in the upper half of the coastal plain. It is usually called the Red Oak in this state. While handsome enough, the Black Oak is more subject to breakage and decay than others of like stature, and should not be selected for planting. In Chapel Hill it reaches a circumference of 11 ft., 4 in. at 5 feet from the ground (Prof. Howell's yard) and in Raleigh 16 feet, 1 inch at the same height from the ground (Mr. William Andrew's yard). Dates of flowering: April 5, 1903; April 14, 1909; April 19, 1915; April 16, 1916.

57. Quercus falcata Michx. Spanish Oak.

A large and very common upland tree with gray bark and deep green foliage; the under side of the 3-5 lobed, rather narrow leaf is covered permanently with a yellowish-gray tomentum, and the central lobe is much longer and narrower than in the other species. In young trees and on sprouts the leaves are wedge shaped and three-lobed at the end. The acorns are small with a red scar. The Spanish Oak, usually called Red Oak, extends from the coast to an elevation of something over 2000 feet in the mountains. It is long-lived, durable, and not easily subject to decay, and in Chapel Hill reaches a circumference of 16 ft. 9 in. at 5 feet from the ground. (Tree near west gate of campus.) Dates of flowering: April 5,

1903; April 29, 1910; April 7, 1913; April 13, 1914; April 19, 1915; April 13, 1916.

58. Quercus pagodaefolia (Ell.) Ashe. Swamp Spanish Oak.

A large tree of the lowlands and swamps the distribution of which is not yet well known. The leaves, especially those from the upper parts of old trees, are much like the leaves of the Spanish Oak, but whiter beneath, and with a pointed rather than a rounded base; leaves of young trees are much broader and not so tomentose beneath; acorns small. This species is amply distinct from *Q. falcata* in Durham and Orange Counties. Only in old trees do the leaves resemble those of the latter in shape and for at least fifteen or twenty years the leaves are shaped much like those of the Black Oak. Examples: trees in swamp of New Hope Creek, about ¼ mile below Durham-Chapel Hill bridge, reaching 16 feet in circumference, 5 feet from the ground, 20½ feet, 3 feet from the ground.

59. Quercus Catesbaei Michx.* Turkey Oak.

A very abundant and characteristic small tree of the sand hills, and other poor sandy soil, in the southeastern part of the state from the coast to Richmond and Moore Counties. Leaves rigid, with

* On poor dry soil on Crowder's and King's Mountain and in a few other similar situations, there is a dwarf scrub oak usually about 3-5 feet high, that is easily recognized by its short, broad leaves, with a few shallow, distant notches and a whitish tomentose under surface. The acorns are about ½ inch long and are seated in a shallow cup. This is the Bear Oak (*Q. ilicifolia-Q. nana*).

two or four long pointed, distant lobes on each side, and a long narrow central lobe, smooth on both sides, the stalks very short; acorns of medium size, tomentose, more than half enclosed in the cup.

60. Quercus marilandica Muench. Black Jack Oak.

The common, knotty scrub oak with drooping branches and large leaves that are broadest at the outer end and brownish scurfy on the under surface; acorns medium sized, black, with a deep cup. It is plentiful in dry or poor soil from the coast to moderate elevations in the mountains. Dates of flowering: April 10, 1903; April 16, 1909; April 5, 1910; April 8, 1913; April 20, 1915; April 16, 1916. Example: tree in front of Dr. Battle's, by walk to campus.

61. Quercus nigra L. Water Oak.

A tree that grows plentifully along streams and in low grounds in the coastal plain, and extends along streams into the central part of the Piedmont. Branches drooping; leaves small, smooth, without teeth, broadest at the outer end; acorns small, in a shallow cup, abundant. Dates of flowering: April 10, 1903; April 29, 1910; April 20, 1915. Examples: trees near the branch south of the Peabody building.

62. Quercus Phellos L. Willow Oak.*

A common tree of the low grounds and flats of the coastal plain and extending more sparingly into the Piedmont. Leaves small, narrow, willow-like, pointed at both ends; acorns small, not abundant. It is related to the Water Oak, but is of larger size and of longer life. As an ornamental tree, it has no superior, and reaches in Chapel Hill a circumference of 12 feet at 5 feet from the ground, and a spread of 72 feet (Episcopal Manse). Dates of flowering: March 25, 1903; April 6, 1909; March 28, 1910; April 19, 1915; April 13, 1916.

63. Quercus laurifolia Michx. Laurel Oak.

This is a beautiful, nearly evergreen oak occurring in moist woods and along streams in a rather narrow strip along the coast. It is intermediate in appearance between the Willow Oak and the Water Oak. Leaves thick, usually without lobes, sometimes with a few notches, evergreen in large part, some falling from the periphery of the tree during the winter; acorns much like those of the Water Oak, borne very abundantly and almost all viable.

The Laurel Oak is becoming very popular as an

* Hybrid Oaks are often met with and it is sometimes hard to recognize the parents. In Chapel Hill there is a tree across the road from the cemetery that seems to be a hybrid of the Willow Oak and Spanish Oak, and another, by the rock wall east of the class athletic field that seems a hybrid of the Willow Oak and Black Jack Oak. A tree similar to the last stands by the road leading from the Raleigh Road to the Mason farm. Some of its leaves are over 9 inches long. In the herbarium we have collections that appear to be hybrids of Willow Oak and Black Jack Oak from Davie County, and of Willow Oak and Water Oak from Chatham County.

ornamental tree and is much used as a street tree in our eastern villages. In middle South Carolina it is called the Darlington Oak, and is sold by some nurseries under that name (see Coker in Journal Elisha Mitchell Soc. 32:38. 1916 for further details).

64. Quercus imbricaria Michx. Shingle Oak.

This is a rather small oak occurring along streams and in good soil in the mountains and east to Burke and Wilkes Counties. Leaves oblong-lanceolate, entire, deep green and shining above, pale green and pubescent below, larger and broader than those of the Willow Oak or Water Oak; acorns of medium size, about half enclosed by the cup.

65. Quercus cinerea Michx. Upland Willow Oak.

This is a common small tree of the sand hills and dryer pine flats of the coastal plain, that can be easily recognized by the small, oblong, entire leaves that are decidedly whitish tomentose beneath. The acorns are small and set in a shallow cup. This and the Turkey Oak make up most of the smaller tree growth of the sand hills.

ELM FAMILY
(URTICACEAE)

66. Ulmus fulva Michx. Slippery Elm.

A tree not at all common with us, named from the slick mucilage in the inner bark. The young twigs and leaves are very hairy, the upper side of the leaf harshly tomentose and the under side densely

velvety; edge of the flat fruit wings smooth. It is mostly found in the low grounds or near the foot of hills in the Piedmont, and sparingly in the lower mountains and coastal plain. Date of flowering: March 18, 1912. Examples: trees near foot of Mt. Bolus and by Morgan's Creek. The large elm in the old Alexander yard is of this species.

67. Ulmus americana L. White Elm.

A large and beautiful tree that is plentiful in low grounds of the coastal plain and in the Piedmont to Guilford and Mecklenburg Counties. Leaves not so fuzzy as those of the Slippery Elm, slightly roughish above, minutely soft velvety or smooth below; twigs smooth, edge of fruit wings hairy. The Elm-leaf beetle that has injured or destroyed so many of the fine elms in the north is present in North Carolina, but does very little damage except to the few English Elms that are cultivated. Occasionally an individual White Elm seems unusually susceptible and suffers considerably every year. Such a tree is the one in Prof. Patterson's yard. Dates of flowering: March 1, 1903; January 12, 1909; February 22, 1910; March 16, 1912; January 28, 1913; February 2, 1914; February 16, 1915; January 31, 1916. Example: The large elm at the northeast corner of the Old West Building.

68. Ulmus alata Michx. Winged Elm.

The most common elm of the Piedmont and found throughout the state except in the higher mountains.

It is named from the corky wings along many of the branches. Leaves small and nearly or quite smooth above, minutely velvety below on the veins; edge of the fruit wings hairy. This elm is much inferior to the other two as an ornamental, as it is smaller and shorter lived. It propogates quite readily from the seeds and must constantly be removed from borders, fences and rock walls. It is one of the few trees that lightning does not kill. Dates of flowering: March 1, 1903; February 26, 1908; January 12, 1909; February 28, 1910; March 17, 1912; January 28, 1913; February 4, 1914; February 15, 1915; January 30, 1916. Examples: trees between Davie Hall and the Chemistry building.

69. Celtis occidentalis L. Hackberry.

A large tree preferring streams and low grounds, but also found to some extent in uplands. Bark rough with corky warts; leaves 2-4 inches long, decidedly one-sided, in our state usually smoothish, but sometimes with decidedly rough leaves on the same tree, mostly ovate-lanceolate and with a long point, edges usually toothed upward and entire below; fruit small, toothed upward and entire below; fruit small, about 3-4 sixteenths of an inch in diameter, nearly globular, purplish-black, dry, sweet, but mostly stone. The Hackberry is found over the entire state except in a few of the most mountainous counties, but is most abundant in the swamps of the coastal plain. The variable character of this tree has led to

the description of several forms that are treated as species by most botanists. Our North Carolina tree that we know is the form described as *C. Smallii* by Beadle, but we cannot find differences that will hold constant between this and *C. crassifolia* and *C. occidentalis.* (A very distinct species is *C. georgiana* Small, which is a shrub of dry rocks and hills. The leaves are small with few or no teeth and the fruits are dun or black colored, on short stalks. It occurs rather plentifully around Chapel Hill). Date of flowering of *C. occidentalis*: April 18, 1915.

70. Morus rubra L. Red Mulberry.*

A rather scarce small tree of the low grounds found throughout the state but most abundant in the middle section. Leaves ovate, hairy, rough above and soft tomentose below (the leaves on young plants may be very large and variously lobed); fruits red or black, edible. Dates of flowering: April 4, 1903;

* White Mulberry (*Morus alba* L.), a small tree with smooth and shining leaves and whitish fruits, a native of the Old World, is imperfectly naturalized at Chapel Hill. Example: tree by tennis court in grove east of Arboretum. This is an attractive small tree that is quite desirable for narrow streets and lawns, but only male trees should be planted in such places, as the abundant fruits are a nuisance under foot. It is well to plant a female tree in the border for the use of the birds. Dates of flowering: March 27, 1903; March 28, 1909; March 27, 1916.

Paper Mulberry (*Broussonetia papyrifera* (L.) Vent.), sprouts freely from the roots, and has commonly escaped as a troublesome weed. It is a small tree with greenish bark, hairy twigs, and leaves that are rough above and velvety beneath. Our trees are all male and do not bear fruit. Examples: trees in low place on Rosemary Street, near the old Mangum Place. Dates of flowering: April 6, 1903; April 19, 1909; April 4, 1910.

Osage Orange (*Maclura pomifera* (Raf.) Schneider), though not native east of the Mississippi, has been much cultivated and is occasionally found spontaneous at Chapel Hill. A thorny tree with shiny ovate leaves, and large yellowish fruits on the female trees. Examples: trees in hedge along north wall of the campus and a young tree in meadow of Bowlin's Creek southwest of Mt. Bolus. Date of flowering: May 10, 1916.

April 19, 1909; April 5, 1910; April 15, 1913; April 23, 1915; May 4, 1916. Example: tree near barn, Glenn Burnie Farm.

MAGNOLIA FAMILY
(MAGNOLIACEAE)

71. Magnolia tripetala L. Umbrella Tree.

A small tree named from the clusters of large leaves at the ends of the branches. Bark light, smooth; flowers very large, white, bad smelling; fruits oblong, reddish at maturity, less than 5 inches long. Found near streams and in damp rich soil throughout the state, but absent in considerable areas, as in the sand hills. Examples: trees along Battle's branch. Dates of flowering: April 28, 1903; April 21, 1909; April 15, 1910; April 22, 1913; April 25, 1915; May 3, 1916.

72. Magnolia Fraseri Walt. Long-leaved Cucumber Tree, Mountain Magnolia.

A small tree with smooth bark and large leaves which are clustered at the ends of the branches as in the Umbrella Tree; but the leaves are obovate-spatulate and are auricled at the base, and the flowers are cream colored and fragrant. The fruit is red at maturity and shaped like a cucumber. It occurs in cool soil throughout the mountains, and extends at places into the upper Piedmont.

73. Magnolia macrophylla Michx. Large-leaved Cucumber Tree.

A rare tree with very large leaves, 20-30 inches long, narrowed and heart-shaped at the base, white and pubescent beneath; flowers large and fragrant; fruit nearly globular, 2-6 inches long. In this state it has been found in Lincoln County and on the French Broad River, near Asheville.

74. Magnolia acuminata L. Cucumber Tree.*

A large tree of the mountains and, according to Pinchot and Ashe, extending down to Stanley, Stokes and Gaston Counties. The narrow red fruit somewhat resembles a cucumber; leaves smaller than in the other mountain magnolias, about 6-8 inches long and 3-4 inches broad, whitish pubescent beneath; flowers yellowish green; fruits 2½-3 inches long. Handsome in cultivation.

75. Magnolia grandiflora L. Magnolia or Bull Bay.

A large tree with thick, evergreen leaves, 5-8 inches long, shiny dark green above and rusty pubescent beneath; flowers large, white, fragrant; fruits 3-4½ inches long. Found within this state only sparingly in the swamps of Brunswick County. Common as a cultivated tree, and near Chapel Hill young seedlings are occasionally found in woods.

* *Magnolia cordata* Michx. is a cultivated magnolia similar to the Cucumber Tree, and usually considered a variety of it. The leaves are broader, more heart-shaped at the base, and more persistent, and the flowers are smaller and brighter yellow than those of our Cucumber Tree. Wild forms, at least approaching the cultivated ones, are said to occur in the mountain woods of the lower Appalachians in North Carolina, South Carolina, and Georgia.

76. Magnolia virginiana L. [Magnolia glauca L.] Sweet Bay.

A small tree found in swamps or near the water in the coastal plain, and according to Curtis, in the middle district though rare there. Leaves small, averaging less than 5 inches long, white beneath, evergreen or partly so; flowers white and very fragrant; fruits small, 1¼-2 inches long, red.

77. Liriodendron Tulipifera L. Tulip-tree, "Poplar".

Our largest tree, and one of the most important for lumber. It is common in rich soil in the Mountains, where it occasionally reaches a height of 150 feet and a diameter of ten feet. It is also abundant in valleys and cool woods in the Piedmont, and occurs less commonly in valleys on the coastal plain. The Tulip Tree is straight and quick growing, with light, close-ridged bark and smooth leaves, which are truncate and shallowly notched at the ends, and turn a beautiful yellow in the fall; flowers tulip-shaped. A very fine tree in cultivation, but very susceptible to decay, and nearly all our trees are hollow. Dates of flowering: April 3, 1903; April 17, 1909; April 6, 1910; April 15, 1916. Example: "Davie Poplar."

CUSTARD APPLE FAMILY
(ANONACEAE)

78. Asimina triloba Dunal. Pawpaw.

A small tree or shrub of the low grounds of the whole state, but uncommon in the mountains and the

sandy southeastern part. Rarely over 15 feet high or three inches in diameter; with somewhat the appearance of the Umbrella Tree, but the leaves are smaller, 4-8 inches long, and are alternate along the branches instead of clustered at the ends. Fruit yellowish-brown, short, thick, sausage-shaped, edible. Dates of flowering: April 11, 1903; May 7, 1909; April 12, 1910; April 8, 1913; April 16, 1916. Examples: trees in swamp of Bowlin's Creek, below Handcock's bridge.

LAUREL FAMILY
(LAURACEAE)

79. Sassafras variifolium (Salisb.) Ktze. Sassafras.

A small aromatic tree of dry soil, very common over the whole state except the higher slopes of the mountains. Bark roughly furrowed; leaves thin, variously shaped; fruits blue with red stalks, borne only on female trees. Dates of flowering: March 20, 1903; April 9, 1908; March 20, 1909; March 21, 1910; March 16, 1913; April 13, 1915; March 27, 1916. Examples: trees below peach orchard, Glenn Burnie Farm.

80. Persea borbonia (L.) Spreng. Smooth Red Bay.

A small, evergreen, aromatic tree inhabiting swamps near the sea. Leaves thick, rather narrow, 2-4 inches long, pointed at both ends, shiny green above, pale and nearly smooth beneath; twigs smooth or sparsely hairy; flowers small, creamy, two or three

together on a common peduncle which is less than an inch long; fruits dark blue, about ½ inch long, one seeded.

81. Persea pubescens (Pursh.) Sarg. Red Bay.

A small tree of the eastern swamps similar to the last, but with the new twigs and leaf stalks rusty velvety, and the leaves velvety beneath; leaves 4-6 inches long; peduncles 2-3 inches long; fruits about ¾ inch long. This is the common Red Bay through most of the coastal plain. The smooth species (*P. borbonia*) seems to prefer the proximity of the sea.

WITCH HAZEL FAMILY
(HAMAMELIDACEAE)

82. Hamamelis virginiana L. Witch Hazel.

Usually a shrub, but becoming a small tree towards the mountains. Common along streams and in moist woods through the Piedmont and in the mountains to an elevation of 4000 feet, descending sparingly along shady bluffs into the coastal plain. Leaves oval to elliptic, with a wavy, barely toothed edge; flowers yellowish with long slender petals, appearing in the fall; fruit a scurfy, blunt pod containing two polished seeds which ripen in summer and are shot for some distance by the sudden popping of the pod. Date of flowering: November 9, 1913.

83. Liquidamber Styraciflua L. Sweet Gum.

A common large tree with fragrant, five-pointed leaves, winged branchlets, and round, prickly, polish-

ed fruits. This is one of our finest trees and is common in the low grounds of the whole state except in the mountain section, where it is found only along the larger streams at low elevations. In the Piedmont it is also found in upland woods. It reaches a very large size, sometimes a height of 140 feet and a diameter of 4 feet. Dates of flowering: April 1, 1903; April 5, 1908; April 6, 1909; April 3, 1913; April 23, 1915; April 14, 1916. Examples: trees in the swamp of New Hope Creek below the bridge on the Durham-Chapel Hill road, where they reach 12½ feet in circumference 5 feet from the ground.

PLANE TREE FAMILY
(PLATINACEAE)

84. Platanus occidentalis L. Sycamore.

A large tree with white branches and round, pendant fruits that hold their seeds until spring. Bark scaling off in thin plates; leaves large and broad, 4-8 inches across, with many irregular lobes and teeth, very wooly-pubescent when young, the enlarged base of the leaf stalk enclosing the bud. Common along the streams of the whole state, often spontaneous in uplands and much cultivated. It is one of our largest trees and in this state often reaches a height of 110 feet and a diameter of 5 or 6 feet. It reaches a much larger size in the middle west, sometimes with a diameter of 15 feet. Many of our trees are being killed by the Sycamore Mildew (*Micros-*

phaera Platani Howe), that attacks the leaves at the top of the tree and gradually works down: for this reason the planting of this tree is not advised. Dates of flowering: April 27, 1903; April 22, 1909; April 1, 1910; April 10, 1916.

ROSE FAMILY
(ROSACEAE)

85. Sorbus americana Marsh. Mountain Ash.

A small tree or shrub with smooth bark; leaves compound with 9-17 leaflets which are toothed, resembling the leaves of the Sumach; flowers small, dull white, in Elder-like clusters 3-5 inches across. The bright red fruits are small, less than 1/4 inch in diameter, and hang on through the winter. In Canada the Mountain Ash grows in moist and rocky woods and is much cultivated, but in this state it is found only along the summits of the higher mountains and does poorly in cultivation.

86. Amelanchier Botryapium (L. f.) DC. Swamp Shad-bush.

A slender shrub or small tree growing usually in the low grounds, and rare at Chapel Hill. Leaves obovate, with us usually slightly cordate at base, apex acute, margin with numerous, small, close-set, acute teeth, lower surface densely white tomentose until maturity or later, whitish green from the first, not purplish. Flowers in nodding racemes, usually about 6-12, both peduncles and pedicels closely pubesent; calyx lobes pubescent, reflexed at base when

the petals fall, broad and abruptly long pointed; petals white, oblong. Fruit purplish red, scarcely edible, often diseased by the attack of a fungus. There is much confusion as to the correct name for this tree. In Britton's trees it is called *A. intermedia* Spach; in Gray's Manual, 7th ed., *A. canadensis,* var. *Botryapium;* and Wiegand (Bull. T. B. C. 14:150. 1912) calls it *A. canadensis.*

87. Amelanchier canadensis (L.). Medic. [A. laevis Wiegand.] Shad-bush, Service-Berry.

A shrub or small tree, much like the preceding but distinguished by the leaves being purplish brown until full maturity, and by the much more scanty pubescence on the leaves and inflorescence. By maturity the leaves are nearly or quite glabrous, but in youth there are hairs on both surfaces, the difference between our two species in this respect being only a matter of degree. Calyx lobes narrower and more lanceolate than in the above, and the fruit more abundant and of better quality. Dates of flowering: March 8, 1903; March 15, 1908; March 1, 1909; March 23, 1910; March 26, 1912; March 23, 1916. The time of flowering varies considerably in different plants. In 1916 some were in bloom March 23, others not until April 17th.

This is a rather common plant of dry woods, hillsides and creek bluffs and banks, usually a shrub, but reaching at times in the mountains, a height of 45 feet and a diameter of 20 inches, even in Chapel Hill

reaching a height of 20 feet and diameter of 6 inches. A tree of this size stands on the south bank of Bowlin's creek about 100 yards northwest of the cow barn on Glenn Burnie Farm. The fruit was fully ripe on this tree on May 28, 1916.

88. Pyrus angustifolia Ait. Narrow-leaved Crab Apple.

A low, broadly rounded, thorny tree, most common in the flat woods of the lower coastal plain, and extending up along the large rivers into the lower part of the mountain district. Leaves narrow, 1½-3 inches long, ½-1½ inches wide, toothed, sometimes slightly lobed, thick, shining above with an evergreen appearance; flowers large, about 1 inch across, pink, and very fragrant; fruit a small, fragrant, sour, yellowish-green apple, about 1 inch in diameter.

89. Pyrus coronaria L. Crab Apple.

Leaves ovate to triangular, often three lobed, toothed, thin; flowers 1½-2 inches across, pink to white, calyx lobes velvety on the inner surface, very fragrant; fruits 1½-2 inches in diameter, yellowish-green, fragrant, and sour. In this state found only in the mountains, where it is common in old fields and open woods.

90. Crataegus Crus-galli L. Cock-spur Thorn, Hog-apple.

A small thorny tree that is said to occur throughout the state. Leaves small, mostly 1½-2 inches long, ob-

ovate or spatulate, thick, smooth, upper side shiny, the broad end toothed and usually rounded; thorns very long, usually two inches or more; fruits dull red or greenish red, about ½ inch in diameter, with one to three, usually two, large nutlets. Dates of flowering: May 19, 1914. Examples: trees in meadow 200 yards above Chapel Hill-Durham road bridge on New Hope Creek. In Orange County this tree with smooth leaves is found only in the low grounds.

91. Crataegus berberifolia T. & G. Barberry-leaved Haw, He Hog-apple.

A low broad-topped tree with many stout thorns, 1-2 inches long. This tree reaches its northern limit in North Carolina and is not rare on the hills around Chapel Hill. Leaves ovate-spatulate, ¾-2½ inches long, $^1/_3$-1 inch wide, thick, shiny and rough pubescent above, softly and rather sparcely pubescent beneath, toothed above, the lower half or third even; flowers in clusters of five to nine, the flower-stalk and ovary very hairy; fruit oblong, dull orange or red or greenish-red, $^5/_{16}$-⅜ inch thick, the surface slightly short hairy under a lens at maturity. This Haw is called the He Hog-apple around Chapel Hill on account of the usual lack of fruit, and this year (1916) for the first time we have found a little fruit on them.* Dates of flowering: May 20, 1901; May 7,

* It has recently been shown that many of the supposed species of Crataegus are probably hybrids, with a large part of the pollen aborted (Journal of Heredity 7:266. 1916).

1916. Examples: Trees on Glenn Burnie Farm, by road to Sparrow's Mill.

92. Crataegus punctata Jacq. Dotted Thorn.

A low, broad-topped, very thorny tree; widely distributed farther north, but in this state confined to the western part, where it is common along the cold streams and around the summits of the high mountains, ascending to an elevation of 6000 feet. Leaves obovate, 1½-3 inches long, ½-2 inches wide, jagged toothed, hairy when young, dull grayish-green above, thin; flowers many in a cluster, hairy; calyx minutely glandular serrate; anthers pink; fruits short-oblong, ½-1 inch in length, red or yellow, white dotted.

93. Crataegus collina Chapm. Chapman's Hill Thorn.

Closely related to the Dotted Thorn, but found in the foot hills, ascending to an elevation of 2500 ft. The anthers are yellow and the fruits are globose, 1/3 to ½ inch in diameter, red, and pale dotted. Frequent in fields and open dry woods to the south of Asheville.

94. Crataegus viridis L. Green Haw.

A larger, sparsely thorny Haw, reaching a height of 35 feet and a diameter of 20 inches; found in low moist soil along the streams and swamps of the eastern part of the state and extending up the larger streams into the mountain section to an elevation of 1500 feet. Leaves ovate to oblong-ovate, broadest about the middle, jagged toothed, often three lobed,

1-3 inches long, ½-1½ inches wide, dark green and shiny above; flowers many in a cluster; fruits many in a cluster on a long drooping stalk, bright red, globose, ¼ inch or less in diameter.

95. Crataegus Boyntoni Beadle. Boynton's Thorn.

Leaves broadly ovate or oval, 1-2½ inches long, 1-2 inches wide, jagged toothed, sometimes shallowly lobed, yellow green on the upper surface at maturity, thick, leaf stalks glandular; flowers 4-10 in a cluster, stamens 10, calyx lobes sometimes glandular toothed toward the end; fruits nearly globose, angled, ½ inch in diameter, yellow-green with red, and marked with small dark dots. A shrub or small tree, rarely 20 feet high, of the foot hill region where it is found along the banks of streams, borders of fields and upland woods, sometimes ascending to an elevation of 3,000 feet. It is common in the valley of the French Broad River. The range of this thorn is evidently wider than is at present known, as we have a collection from a valley at Hartsville, S. C., in the coastal plain.

96. Crataegus flava Ait. Summer Haw.

A small broad tree of sandy woods, commonly cultivated in Europe. Leaves bronze and hairy when unfolding, yellow green and smooth or nearly so at maturity, oval to obovate, sometimes lobed, 1-3 inches long, ¾-2 inches wide, toothed, the teeth gland tipped, stalks gland tipped; flowers in clusters of 3-7, the calyx lobes usually cut and very glandular, bracts

glandular, flower stalks pubescent; fruits pear-shaped, about ½ inch long and ⅓ inch wide, dark orange-brown.

97. Crataegus senta Beadle. Rough Thorn.

Closely related to *C. flava;* fruit globose, bright red. Abandoned fields and open pine woods near Asheville at an elevation of about 2,200 feet.

98. Crataegus aprica Beadle. Sunny Thorn.

Closely related to *Crataegus flava;* found in sunny exposures on the mountains. The fruits are globose, ¼-½ inch in diameter, red or orange red, and marked with many small dark dots. There are 10 stamens instead of 20 as in *C. flava,* and the anthers are yellow rather than purple or pink.

99. Crataegus spathulata Michx. Spatulate Thorn.

Leaves spatulate to oblanceolate, ½-1½ inches long, ¼-¾ inch wide, toothed, often three lobed at the end, dark green, slightly hairy when young, but smooth at maturity; flowers many in a cluster; fruits globose, small, ¼ inch or less in diameter, red. Usually near the banks of streams or swamps or low depressions in pine woods.

100. Crataegus Marshallii Eggl. [C. apiifolia Michx.] Parsley Haw.

Leaves broadly ovate or orbicular, ¾-1½ inches in diameter, jagged toothed, and with 5-7 deep narrow clefts, leaves and twigs softly tomentose when

young, the upper side of the leaves usually becoming smooth and shiny green; flowers in clusters of 10-12; fruit small, oblong, 1/3 inch long, bright, shining, red. The Parsley Haw is found along the borders of streams and swamps or hammocks in pine barrens through the coast region, and in both low and upland woods of the Piedmont region. At Chapel Hill it is our finnest ornamental Haw. Examples: trees in woods by Durham-Chapel Hill near the county line, and in woods near Meeting of the Waters. In full flower April 30, 1916.

101. Crataegus pruinosa (Wendl.) Koch.* Waxy Thorn.

A shrub or small tree of upland woods and rocky hills of the Piedmont and mountain sections of the state. Branches and thorns gray; leaves ovate, jagged toothed, or shallowly lobed, 1-2¾ inches long, ¾-2½ inches wide, sometimes with short hairs on the upper surface when young, but smooth at maturity, the under side always smooth, leaf stalk wing margined and glandular; flowers few in a cluster, stamens 10-20, a bunch of hairs at the base of the styles, calyx lobes glandular toothed, bracts very glandular; fruits globose to pear shaped, about ½ inch in diameter, red, with small darker dots, more or less pruinose. Examples: trees in woods by Durham-Chapel Hill road near the county line. Dates

* Several other forms accepted as species by some authors, but ignored by others, are so closely related to *C. pruinosa*, and so difficult to distinguish clearly that we are of the opinion that they belong to one variable species, or are a lot of hybrids.

of flowering: May 13, 1889; April 19, 1909; April 24, 1916.

102. Crataegus phaenopyrum (L. f.) Medic. [C. cordata Ait.] Washington Thorn.

Leaves 1¼-2 inches long and about the same width, usually distinctly three-lobed and somewhat resembling a maple leaf, toothed, smooth except for a few white hairs along the veins of the upper surface when young; flowers several together near the ends of long peduncles; fruits scarlet, globose, small, less than ¼ inch in diameter. Rich damp soil of the Piedmont section, extending up the streams into the mountains; not very common; much cultivated and very handsome. Flowers about the middle of June. Examples: trees, among other species, in woods several hundred yards beyond the Durham County line on the Durham road.

103. Crataegus Chapmani (Beadle) Ashe. Chapman Thorn.

Leaves ovate to obovate, 1½-4 inches long, 1¼-3 inches wide, jagged toothed and sometimes slightly lobed, upper surface hairy when young, hairy below; flowers many in a cluster; stalks hairy, calyx lobes glandular-serrate and hairy; fruits in many fruited, drooping clusters, bright red, subglobose to globose, about $^1/_3$ inch in diameter; seeds with hollows on their inner faces. It occurs along the streams in the mountain region.

104. Crataegus tomentosa L. (In the sense of Sargent)*. Pear Thorn.

This is very closely related to Chapman's Thorn, but the fruits are more pear-shaped, duller red, and are borne in erect clusters.

105. Prunus serotina Ehrh. Choke Cherry, Wild Black Cherry.

Usually a small tree with smooth bark when young, rough when old. Leaves oval to lanceolate, 2-6 inches long, rather coarsely toothed, dark-green, thickish, smooth except for a conspicuous patch of reddish down which usually borders the mid rib near the base; fruits small, about $^1/_3$ inch in diameter, black not edible, on short stalks scattered along a common terminal fruiting axis (a raceme). Common through the middle and western parts of the state, not so common in the eastern part. In the mountains it becomes a large tree 100 feet high and 3 feet in diameter. It would be a very important timber tree if large trees were more abundant. Dates of flowering: April 18, 1903; April 9, 1908; April 28, 1909; April 7, 1910; April 16, 1916. Example: Trees on Glenn Burnie Farm.

106. Prunus pennsylvanica L. f. Wild Red Cherry.†

A small tree, in this state found only in the mountains. The bark is smooth and red; leaves ob-

* This is not the *C. tomentosa* of Gray's Manual, a synonym of *C. uniflora* Muench., which is only a shrub.

† The small Choke Cherry (*Prunus virginiana* L.) is a shrub or rarely a small tree that is very rare in this state and so far as we know hs been collected only on Cedar Cliff Mountain, Buncombe

long-lanceolate, 2-5 inches long, ¾-1¼ inch wide, finely toothed, thinnish, pubescent usually along most of the length of the mid rib below; fruits red, sour, about ¼ inch in diameter, fruit stalks in clusters from lateral buds (umbels or corymbs).

107. Prunus americana Marsh. Wild Plum.

A somewhat thorny tree reaching 20-30 feet in height, common along streams in the Piedmont and lower mountains and along large rivers in the coastal plain. Leaves ovate to obovate, 2½-4½ inches long, 1-2 inches wide, closely toothed, smooth or tomentose below; flowers borne in umbels, nearly white to pink, very abundant, and rivalling the Japanese cherry in its delicacy and beauty; fruits reddish, glaucous, ¾ inch in diameter, bitterish and scarcely edible, but making a good preserve. They begin to ripen in August and some trees still have ripening fruit in early October. Several of the best cultivated plums, such as Wild Goose, Wayland and Golden Beauty are supposed to be hybrids between this and the following species. Dates of flowering: March 27, 1903; March 27, 1908; March 31, 1909; March 26, 1910; March 14, 1915. Example: tree on bank of Bowlin's Creek, below Glenn Burnie Farm.

County (Biltmore Herbarium). It occurs both north and south of us, and is much like *P. serotina.*

Prunus cuneata Raf. is a small shrub that has been reported from Henderson County by Memminger. The fruit is borne in small clusters along the twigs.

The Sweet or Mazzard Cherry (*Prunus avium* L.), the common sweet cherry of the orchard and a native of the Old World, is spontaneous in Chapel Hill and no doubt in many other places in the state. The Sour or Morello Cherry (*Prunus cerasus* L.) is probably also spontaneous in some parts of the state.

108. Prunus angustifolia Marsh. Chickasaw Plum.

A small low tree with a dense spreading top, forming the "plum thickets" so common on the edges of fields and in waste places throughout the state. According to an old Indian tradition it was brought from beyond the Mississippi. The leaves are small and narrow, 1-2 inches long, $^1/_3$-$^2/_3$ inch wide, the teeth fine and close. The fruits ripen in early summer and are either red or yellow, about $^2/_3$ inch in diameter, sweet and edible. This species has given rise to several cultivated plums such as the Newman and Lone Star. Dates of flowering: about March 10, 1903; March 15, 1908; February 16, 1909; March 20, 1910; March 25, 1912; March 14, 1915; March 5, 1916. Examples: trees in pasture, west side of Glenn Burnie Farm, where they reach a height of 11 feet and a diameter of 3 inches.

109. Laurocerasus caroliniana (Mill.) Roem. Carolina Laurel Cherry.

A small evergreen tree found wild only in the southeast corner of the state near the coast, but much used throughout the coastal plain as an ornamental and as a screen. Leaves oblong-lanceolate, 2-4½ inches long, ¾-1½ inches wide, with a few teeth or the edges entire, thick, shiny above; flowers small, in dense racemes; fruits black, oblong, about ½ inch long, hanging on the tree through the winter; not edible. The wilting leaves contain a deadly poison.

LEGUME FAMILY
(LEGUMINOSAE)

110. Gleditsia triacanthos L. Honey Locust.*

A thorny tree of waste places, ditch banks, etc., throughout the state. It is said to be an introduced tree from west of the Alleghanies, but has now become thoroughly naturalized. The fruits are long, flat, black, edible pods, that are one of the principal ingredients of Persimmon beer. Dates of flowering: April 30, 1903; April 29, 1909; April 20, 1910; April 30, 1913; May 9, 1916. Example: tree at west end of the Arboretum, above spring.

111. Cercis canadensis L. Redbud.

A small tree of hillsides and valleys, common in the Piedmont and rarer in the coastal plain, with light smooth bark. Leaves heart-shaped; flowers magenta-colored, pea-shaped; pods small, flat, numerous. Dates of flowering: March 16, 1903; in 1908 the flower buds were killed by the snow of March 20, would have bloomed in three days; March 20, 1909; March 23, 1910; March 26, 1916. Examples: trees near barn on Glenn Burnie Farm.

* The "Mimosa" (*Albizzia Julibrissin* Durazzini) is a very attractive small tree of the legume family introduced originally from Asia, but now escaped and well established in parts of the Piedmont, as in Orange County. Bark light, smooth; leaves divided into 40-50 small, sensitive leaflets, not casting a deep shade; flowers large, clustered, pink, thready, sweet scented; fruit a flat pod about 2-3 inches long. Dates of flowering: June 12, 1910; June 15, 1915; June 11, 1916. Examples: escaped trees in woods west of athletic field and in woods south of Dr. Battle's house.

Gymnocladus canadensis Lam., the Kentucky Coffee Tree, is also occasionally spontaneous in neighborhoods where it is cultivated. Trees cultivated in Chapel Hill are all male and bear no seeds. The tree is a native of the middle west and does not quite reach North Carolina.

112. Cladrastis lutea (Michx. f.) Koch. Yellow-wood.

A beautiful tree with pinnately compound leaves, white, wistaria-like flowers in drooping panicles, and pods about 3-4 inches long. The wood is yellow and yields a dye, and the branches are thornless, by which it is easily distinguished from the Black Locust as well as others. The Yellow-wood is one of the rarest trees in North Carloina, being known only from Swain, Clay, Macon, and Cherokee Counties (Pinchot and Ashe, p. 56). It is fine in cultivation.

113. Robinia Pseudacacia L. Black Locust.

A tree with small thorns and with dark, rough or ridged bark. When in bloom a mass of white, pea-shaped, fragrant flowers that hang in clusters like Wisteria; fruit a flat pod. It is a native of the mountains, ascending to 4000 feet, but in the Piedmont where it is cultivated, it is often seen around deserted homesteads where it retains possession and multiplies extensively by shoots from the roots. Dates of flowering: April 20, 1903; April 29, 1909; April 14, 1910; April 25, 1916. Examples: cultivated trees on the campus south of the Smith building.

114. Robinia viscosa Vent. Clammy locust.*

A small tree or shrub, mostly confined to the southern part of the mountains, and easily recognized by the sticky twigs and leaf stems, and the rose colored

* Several other species of shrubby locusts occur in this state, all with rosy or rosy-purple flowers.

flowers. It is often cultivated and multiplies by suckers.

115. Xanthoxylum Clava-Herculis L. Toothache Tree, Prickly Ash.*

A peculiar small tree with strong, short thorns on the main stem and branches, large pinnately compound leaves and large clusters of small greenish-white flowers terminating the branches. The Toothache Tree is so named because the pungent bark and other parts act as a counter irritant and help to relieve toothache. It is confined to a narrow strip along the sea coast. Ayres and Ashe in error, credit this to the mountains.

SUMACH FAMILY
(ANACARDIACEAE)

116. Rhus typhina L. Staghorn Sumach.†

This is a small tree or shrub, sometimes 30 feet high, which is confined to moderate elevations in the mountains. It is easily recognized by the compound

* *Ailanthus glandulosa* Desf. (Tree of Heaven, Copal) is a cultivated tree from China and Japan which is frequently spontaneous in waste places. The large, pinnate ~~twice~~ compound, smooth leaves are bad smelling when crushed, and so are the male flowers. The female flowers are only slightly unpleasant, and only trees bearing these should be planted, especially as the conspicuous clusters of reddish-green fruits are quite decorative. Date of flowering: May 25, 1916. Quassia Family (*Simaroubaceae*).

Melia Azedarach L. (China-berry Tree), a native of Persia and India, is also frequently spontaneous. The leaves are large, doubly pinnately-compound, and with cut leaflets; the flowers purplish and with a heavy fragrance; fruit a light-colored berry with a ridged stone containing several seeds. As a rule all of the seeds in a berry do not come up the same year. A low spreading variety, called the Umbrella Tree, which originated in Texas, is now very popular. Mahogany Family (*Meliaceae*).

† *Rhus vernix* L. (Poison Sumach), and *R. copallina* (Dwarf Sumach) occasionally reach the height of small trees, but are essentially so shrub-like in character that they are not here included.

leaves, stout, naked branches and thick, densely fuzzy twigs. The red berries are acrid and borne in large panicles at the ends of the branches. The wood is yellow and aromatic. Date of flowering: May 29, 1916, in cultivation at Chapel Hill.

CYRILLA FAMILY
(CYRILLACEAE)

117. Cyrilla racemiflora Walt. He Huckleberry.

A shrub or small tree confined to borders of streams, bays and swamps in the coastal plain from the coast to Halifax, Wake, and Anson Counties. It is sometimes 15 feet high and 4 feet in circumference, and is very decorative with the narrow, drooping racemes of small white flowers. The leaves are small, oblong, entire, shining, turning a fine red or mottled red and green in fall, and persisting through most of the winter. The plants can grow in water over a foot deep, and in such situations the bark under the water does not decay and becomes so thick as to enlarge the circumference of the tree to 5½ feet at times.

HOLLY FAMILY
(AQUIFOLIACEAE)

118. Ilex opaca Ait. American Holly.

A well known tree with thick, spiny, evergreen leaves and red berries. It is common in the coastal plain and most of the Piedmont in damp, well-drained woods, and extends to some extent into the lower

mountains. At Chapel Hill small seedlings are common in the woods near town, but large ones are rare except at a distance of several miles. This scarcity near town is probably the result of over a century of Christmas decorating. Dates of flowering: May 1, 1903; April 27, 1909; April 16, 1910; April 29, 1913; May 7, 1915. Examples: trees in woods near The Caves, and cultivated trees on the campus.

119. Ilex vomitoria Ait. Yopon.

This slender, small, evergreen tree is confined to a narrow strip along the coast, and forms a conspicuous part of the tangled growth behind the sand dunes. The leaves are small, about ½-1 inch long, oval, evenly crenated, smooth; fruit a very small, bright-red berry formed abundantly on the female trees, and very ornamental. This holly does well in cultivation even as far inland as Chapel Hill, but suckers freely and is apt to be straggling in shape. In the region of the Dismal Swamp the dried leaves are said by Curtis to be used as a substitute for tea, and it is known that they contain a considerable amount of caffeine, about .27% of the dry weight (Venable, Jour. Mitchell Soc. 2:39. 1884-85). As the name indicates, the leaves are generally supposed to have an emetic effect, and the Indians certainly used a decoction containing them to produce vomiting. It seems, however, that this effect was the result of other herbs that were added and not of the Yopon leaves (Havard, Bull. Tor. B. C. 23:41. 1896).

120. Ilex Cassine L. Dahoon Holly.*

This is a small evergreen tree of swamp margins near the coast. Leaves about 2-4 inches long, thick and leathery, the margin usually smooth, but sometimes strongly prickly; berries red, persistent, about ¼ inch thick. This species is quite ornamental and worthy of cultivation. It is easily distinguished from its relatives by its long narrow leaves.

121. Ilex decidua Walt. Deciduous Holly.

A large shrub or small tree, usually with several stems, that is common on river banks, flats and hillsides in the Piedmont, extending into the mountains to an elevation of 1500 feet. In the low country it is abundant in the deep swamps of the large rivers. Leaves small, thin, narrow, not evergreen. The branches of the female tree are loaded with small red fruits that hang on most of the winter. Dates of flowering: April 14, 1903; April 19, 1908; April 13, 1910; April 27, 1916. Example: the large clump by upper road to Scott's Hole.

122. Ilex monticola A. Gray. Mountain Holly.†

A shrub or small tree, rarely 25 feet high, found from Orange County to the high mountains. The leaves are thin, deciduous, finely toothed, ovate-

* Further inland on the wet pine barrens there is found a little holly with very small, myrtle-like, evergreen leaves and red berries, that rarely becomes a very small straggling tree, but is essentially a shrub and is best not included among the trees. It is *Ilex myrtifolia* Walt.

† The two shrubs, *Ilex verticillata* (L.) A. Gray, and *I. laevigata* (Pursh.) A. Gray, rarely reach up into slender trees. The two shrubby Gallberries of the coastal plain are also hollys.

lanceolate with a long point, smooth on both sides, about 2½-3½ inches long, and 1-2 inches broad; berries red, on short stems, about ⅜ inch in diameter. In Chapel Hill this is only a shrub, reaching a height of about 8 feet, and is not rare in the woods and sometimes in open pastures, as at top of Lone Pine Hill. A tomentose form of this from the mountains has been called *Ilex Beadlei* Ashe.

MAPLE FAMILY
(ACERACEAE)

123. Acer saccharinum L. Silver Maple.

A good sized tree of rare occurrence in rich woods at moderate elevations in the mountains. Leaves deeply cut and toothed, white and smooth beneath; flowers without petals, appearing before the leaves. This maple is of very rapid growth and is often planted for this reason, but its brittleness and susceptibility to scale makes it undesirable for cultivation.

124. Acer rubrum L. Red Maple.

A common tree in North Carolina, inhabiting swamps and low grounds in the upper coastal plain and valleys and hillsides in the Piedmont and mountains. Leaves with 3-5 deep lobes which are strongly and irregularly toothed, pale and usually smooth beneath; flowers bright red, appearing very early; fruits red, usually, but sometimes yellowish, ripening

in early summer. The twigs and leaf-stalks are also red, and in autumn, the foliage turns a fine scarlet. This maple is a more desirable shade tree than the above, but is more subject to scale than the Sugar Maple. There are two kinds of flowers, male and female, which are borne on the same tree or different trees. Sometimes a single branch or a few twigs of a tree will bear fruit, the remainder being barren. Dates of flowering: March 2, 1908; March 3, 1910; March 16, 1912; February 20, 1913; February 21, 1915; April 7, 1916.

125. Acer carolinianum Walt. Carolina Red Maple.

This is a near relative of the Red Maple and is so similar to it that with the exception of extreme forms they are not always easy to distinguish. The leaves are usually smaller than those of the Red Maple, and are thicker and less lacerated, both lobes and teeth being less prominent and usually fewer. The lower side is typically covered with a white or rusty tomentum, but this may almost disappear in age. The fruits are like those of the Red Maple. The Carolina Maple is the only species of Maple over the greater part of the coastal plain. In Chapel Hill we have almost the typical form of this tree growing in marshes, as in the north west corner of Rocky Ridge Farm, but many intermediate forms also occur that cannot confidently be referred to either this or the Red Maple.

126. Acer saccharum Marsh. Sugar Maple.

This is the finest of all our maples and very desirable in cultivation. Leaves large, about 4½-6½ inches long and at least as wide, some very small ones, typically with three large lobes above, each with two or four distant teeth, and two narrow, tooth-like lobes at the base, deep green above, whitish and somewhat glaucous below, smooth except for a few small tufts of hairs in the axils of the veins below. The Sugar Maple is plentiful in our mountain valleys and slopes, and reaches a height of over 100 feet. Ayres and Ashe remark that it is "Common north of the Cowee mountains, above an elevation of 2,000 feet on cold moist soil." The Florida Maple (see below) is much like this and is usually confused with it. Their areas approach each other closely if they do not overlap, and observations should be made to find out if the two forms intergrade as they approach each other.

127. Acer floridanum (Chapm.) Pax. Southern Sugar Maple.

This is the close relative of the Sugar Maple that takes its place in the Piedmont and coastal plain regions of this state and from thence southward; just how far it extends towards the mountains has not been worked out, or whether it intergrades there with the Sugar Maple. We have it as far west as Chapel Hill, where it is common along creeks and toward the bases of rocky hills, and is often planted in lawns. It reaches here a circumference of 5 feet, 3 inches.

The appearance and habit is like that of the Sugar Maple, but it is smaller and more spreading, and otherwise differs in preferring lowlands, and in the mostly smaller leaves which are whitish or tawny pubescent beneath, with the lobes usually only undulate or scarcely toothed. The fruits also are smaller and usually somewhat hairy. Dates of flowering: March 28, 1909; April 1, 1912. Examples: Trees along Morgan's Creek on the Mason Farm.

128. Acer leucoderme Small. White-barked Sugar Maple.

This is a small tree or only a shrub, belonging to the Sugar Maple group, and mostly resembling the next species. The bark is very white, the leaves small, green and hairy below, not whitish, with three or five narrow lobes with few or no teeth; fruit quite small, the wings broadly spreading. At present we know of this in North Carolina only from Stanley County where it grows along the falls of the Yadkin at an elevation of about 1000 feet.

129. Acer nigrum F. A. Michx. Black Maple.

This tree resembles the Sugar Maple in size and habit, but differs in the narrow, untoothed lobes, and the green, not whitish, under surface of the leaves. It is a very rare and local tree in North Carolina, known at present only from the mountains of Ashe and Mitchell Counties.

130. Acer pennsylvanicum L. Striped Maple.

A small tree of the higher mountains, inhabiting cool damp soil at elevations above 3000 feet. It is easily distinguished by its reddish-green bark which is striped with light lines, by the large three-lobed leaves with very many small teeth and by the long terminal panicles of drooping fruits.

131. Acer spicatum Lam. Mountain Maple.

A very small tree or shrub growing only at high altitudes in the mountains. It is most like the Striped Maple, but is easily distinguished by the pubescent twigs, the upright panicles of flowers and fruits and the lack of stripes on the bark.

132. Acer Negundo L. Ash-leaved Maple, Box Elder.

A rather small, dioecious tree of sandy river banks and bottoms, rather common in the Piedmont, extending into the lower mountain valleys, and along the larger rivers in the coastal plain. The leaves have three leaflets, which somewhat resemble those of an ash; fruits hanging in elongated clusters. This maple is wide-spreading and of very rapid growth, and for quick shade in lawns is much better than the more often-used Silver Maple or Carolina Poplar. Dates of flowering: March 15, 1903; March 25, 1909; March 28, 1910; April 15, 1915; April 7, 1916. Examples: trees at Scott's Hole.

SOAPBERRY FAMILY
(SAPINDACEAE)

133. Aesculus octandra Marsh. Buckeye.

A large tree in the mountains, sometimes reaching a height of 120 feet and a diameter of 4 feet, and extending as far east as Raleigh, but usually only a shrub in the eastern part of its range. At Chapel Hill it reaches tree size only in cool ravines. The leaves are palmately compound, of 5-7 leaflets at the end of a long leaf-stalk, the leaflets 4-10 inches long, toothed, hairy on the lower surface when young; flowers greenish-yellow, sometimes red, 1-1½ inches long, in clusters 5-7 inches long; most of the flowers with rudimentary pistils and therefore sterile; fruits ovoid, 1½-2¼ inches in diameter, smooth, yellowish brown, the hulls inclosing large, dark-brown, polished seeds. Dates of flowering: March 27, 1903; March 3, 1908; April 27, 1909; April 3, 1910; April 23, 1915; April 14, 1916. Examples: trees below Lone Pine Spring.

BUCKTHORN FAMILY
(RHAMNACEAE)

134. Rhamnus caroliniana Walt. Buckthorn.

Usually a shrub, but sometimes a small tree, found most abundantly along the swamps and river banks in the upper Piedmont region. Leaves 2-6 inches long, 1-2 inches wide, obscurely toothed, tomentose when young, but shining green above and smooth or nearly so when mature, prominently veined beneath;

fruits globose, $^1/_3$ inch in diameter, black, sweet, containing 2-4 nutlets. Date of flowering: June 1, 1916, in cultivation at Chapel Hill.

LINDEN FAMILY
(TILIACEAE)

135. Tilia americana L. American Linden or Basswood.

A large tree reaching a height of 130 feet and a diameter of 4 feet, that is said by Pinchot and Ashe (1897), and by Curtis to occur in the mountains and Piedmont and by the former to be sparsely distributed through the lower Piedmont and coastal plain. However, according to Ayres and Ashe (1905), this tree occurs in the lower Appalachians only on the western slope of the Great Smoky Mountains. Leaves broadly ovate, 3-6 inches long, 3-4 inches broad, toothed, green and smooth on both sides except for axillary tufts of hairs on the under side; fruits oval, about $^1/_3$ inch long, hard, nut-like, tomentose, with short stalks on a common peduncle fastened to a light green leaf-like bract 4-5 inches long, 1-1½ inches broad.

136. Tilia heterophylla Vent. White Linden or Basswood.

Usually a smaller tree than the American Linden and much more common in our state. In the mountains it is plentiful and is sparingly found near streams in the Piedmont and coastal plain. Leaves 2½-7 inches long, 2-5 inches broad and minutely

gray-tomentose with stellate hairs, with very small and inconspicuous tufts of rusty hairs in the axils of the veins beneath; fruit bract 2-3 inches long, about ¾-⅞ inch broad, thinly stellate tomentose beneath, almost sessile and quickly contracted at base, attached to the peduncle for only ½-1¼ inch, the free portion of the peduncle being about ¾-1¾ inch long; fruit densely gray tomentose. It is beautiful in cultivation and like the other Lindens is a favorite with the bees. The form of lower elevations is probably what has been described by Ashe as *T. eburnea* from foot hills of the Blue Ridge. It is said to differ in having the under side of the leaves white-woolly with longer hairs than in *T. heterophylla.*

137. Tilia Michauxii Nutt. Michaux's Linden, White Linden.

This species is one of our rarest trees, and we know of it certainly only from the mountains of Haywood County. It differs from *T. heterophylla,* its nearest relative, in the denser and whiter tomentum on the under surface of the leaves, and the longer, more stalked and more gradually rounded floral bracts which are densely white-tomentose beneath; the leaves are also furnished with more conspicuous, though small, axillary tufts of tawny hairs than in the latter species. In our collection of *T. Michauxii* the floral bracts are 2¼-5¾ inches long, mostly over 4 inches long and gradually narrowed to the basal stalk, which is ¼-½ inch long.

This and the preceding species are very close to each other, and descriptions of the two by different authors do not agree either with each other or with our plants. We have described our plants as they appear in this state, where so far as we know they can be distinguished as indicated.

138. Tilia pubescens Ait. Southern or Downy Linden or Basswood.

A small tree found in deep, sandy fertile soil along the margins of swamps and streams near the coast, and extending little farther west than Wilmington, Newbern and Washington. Leaves 3-7 inches long, rusty downy beneath; twigs pubescent or smooth; fruits about ¼ inch in diameter.

TEA FAMILY
(TERNSTROEMIACEAE)

139. Gordonia Lasianthus Ellis. Loblolly Bay.

A medium sized evergreen tree with a narrow, compact head and broadly ridged bark, found in the low grounds and edges of swamps near the coast. Leaves thick and leathery, narrowly elliptic, 2-6 inches long, shallowly toothed along the edges; flowers white, fragrant, about 2 inches across, both sepals and petals silky; fruit a dry, woody, ovoid pod, about $^2/_3$ inch long and silky on the surface. This is a beautiful tree at all seasons, but particularly so when in flower. Unfortunately it does not do well

in cultivation unless its natural habitat is closely duplicated.

GINSENG FAMILY
(ARALIACEAE)

140. Aralia spinosa L. Hercules Club, Angelica Tree, Prickly Ash.

A small prickly tree or shrub with few or no branches, but with very large, twice or thrice compound leaves, 2-4 feet long, near the top. The leaflets are broadly ovate and toothed; flowers small but very numerous, forming large panicles in the top of the tree; fruit a very small, juicy, black berry. In this state said to occur in rich woods or along streams from the coast to Cherokee (Curtis), but evidently local in distribution, and entirely absent over large areas; rather abundant in some localities, as along Swift Creek in Wake County.

DOGWOOD FAMILY
(CORNACEAE)

141. Cornus florida L. Flowering Dogwood.

A low tree, very conspicuous in flower, that is scattered plentifully through all our woods. The floral display is due to the large white, or sometimes decidedly pinkish bracts that surround each group of small yellow flowers. Swollen places containing insect larvae are very common along the twigs. Leaves ovate, opposite; fruits red. The Dogwood is highly decorative in cultivation and should be much more

used on lawns. Dates of flowering: March 24, 1903; April 3, 1908; April 6, 1909; March 30, 1910; April 3, 1913; April 20, 1915; April 14, 1916.

142. Cornus alternifolia L. Blue Dogwood.

A low tree, in this state found only near streams in the mountains. It differs from the more common Dogwood in that the leaves are borne alternately along the twig as a rule and sometimes have a few obscure, low rounded teeth, though usually with the edges entire; also there are no conspicuous bracts around the small creamy white flowers that are borne in loose clusters; and the berries are blue.

143. Nyssa sylvatica Marsh. Black Gum, Sour Gum.

A tree common over the whole state, growing both in swamps and on the dry hills. Usually a narrow cylindrical tree with short branches; bark deeply furrowed; leaves ovate or obovate, 2-6 inches long, smooth and shining when mature, turning bright red in late summer or early fall; fruits usually three on a common stem, dark blue, about ½ inch long, sour and bitter, the stone indistinctly ribbed. The robins are very fond of the fruits. Dates of flowering: April 19, 1903; April 27, 1909; April 14, 1910; April 26, 1916. Examples: trees back of the Chemistry building.

144. Nyssa biflora Walt. Water Gum, Sour Gum, Black Gum.

A small or good sized tree on the edges of ponds

and streams in the eastern half of the coastal plain. Very similar to the Black Gum, but the fruits usually are only two on a stem, and the stones have prominent rounded ridges; base of the tree usually swollen, and when growing in the water, with erect roots that rise to the surface.

145. Nyssa aquatica L. Tupelo Gum.

A large tree of the deep swamps near the coast. Base much enlarged, leaves 4-12 inches long, ovate, long pointed, edges entire or with a few large teeth, smooth or nearly so and dark green above, pale and hairy beneath; fruits large, dark purple, about 1 inch long, one to the stem, stones with sharp prominent ridges.

HEATH FAMILY

(ERICACEAE)

146. Oxydendrum arboreum (L.) DC. Sour Wood.

A small tree with shiny, pointed, elliptic leaves which have a decidedly sour taste. The small, white, sweet-smelling flowers are formed on finger like racemes which are grouped at the ends of branches in summer. They remind one of Lily of the Valley and make a very attractive centerpiece with ferns. Bees seek them and from them make the esteemed sour-wood honey. The tree is scattered plentifully through most of our woods from the mountains (under 4000 feet) through the Piedmont, then retiring to bluffs of streams and descending to the coast

(Wilmington). Examples: trees along Battle's brook.

147. Vaccinium arboreum Marsh. Sparkleberry.

A small tree found from the lower mountains to the coast, and most plentiful in the coastal plain. In Chapel Hill it occurs on sandy banks and rocky bluffs along the creeks, or as a rare shrub on the uplands. Leaves small, shiny, obovate; fruits small, black, dry, sweetish, scarcely edible. Date of flowering: May 23, 1909. Examples: trees on both sides of Morgan's Creek from King's Mill to Scott's Hole, also in woods east of cemetery, etc.

148. Rhododendron maximum L. Great Laurel.

The Great Laurel is a shrub or small tree, sometimes 25 feet high with a trunk 10 inches in diameter, that is one of the most abundant, conspicuous, and well known plants of the mountains. It descends rather abundantly as far down as Hickory, and is rare and local as far east as Davidson County, where is it known to occur on a bluff about 2 miles northeast of Yadkin College. Curtis, in his Woody Plants, says that this species extends as far east as Orange, but the plant he had in mind is not this species but the Purple or Rose Bay, *Rhododendron catawbiense* Michx., a large shrub which has one of the most singular distributions of any of our plants. Replacing the *R. maximum* on the tops of the highest mountains, it extends in a very scattering way down their eastern sides, and thence on bluffs of rivers

eastward as far as the middle coastal plain. Its eastern limit as far as we know is Selma, where we have found it at an elevation of less than 100 feet.

149. Kalmia latifolia L. Mountain Laurel, Ivy.

A shrub or small tree with smaller, narrower leaves than Rhododendron, and with smaller, saucer-shaped flowers which are provided with curious pockets for the anthers. It is extremely abundant in the mountains and extends along the bluffs of rivers all the way down to the coast (Wilmington). The leaves are poisonous when eaten and will kill cattle. The Indians are said to have sometimes committed suicide with them (Bull. T. B. C. 12:53. 1885). In cultivation this is fine and should be more used along shaded banks. Examples: Plentiful along Morgan's Creek above Pittsboro road crossing. Dates of flowering: May 10, 1903; May 10, 1909; May 16, 1910; May 11, 1915; May 14, 1916. Our two other species of Kalmia, *K. angustifolia* and *K. cuneata,* are small shrubs.

EBONY FAMILY

(EBENACEAE)

150. Diospyros virginiana L. Persimmon.

This very common tree is too well known to need description. It extends from the lower mountains to the sea, but is most plentiful in the upper coastal plain and lower Piedmont. The flowers are of two sorts, male and female, and are borne on different trees. The male trees are barren, the females bear

the well known fruits, which are quite variable in nearly all characters. Contrary to popular belief, some trees ripen their fruit well before frost, and in some the fruit is nearly or quite seedless, as in the tree on the north side of Battle's Grove. Dates of flowering: May 17, 1903; May 12, 1909; May 16, 1915; May 16, 1916.

STORAX FAMILY
(STYRACACEAE)

151. Symplocos tinctoria (L.) L'Her. Sweet Leaf, Horse Sugar.

This small tree or shrub is abundant around bays and flats in the coastal plain, rare and mostly along bluffs in the Piedmont, and less rare, but not common in the lower mountains. Leaves thick, long-ovate, pointed, edges slightly toothed, taste sweet; flowers light yellow, fragrant, borne in bunches along the twigs; fruits small, dry, cylindric, containing one seed. The leaves are greedily eaten by cattle and horses, and are noticeably sweet and partly evergreen. The leaves and bark are the source of a fine yellow dye, and from this the plant is often called Yellow-wood. Near Chapel Hill it is found only on the bluffs of New Hope Creek at "The Caves."

152. Halesia tetraptera L. Snowdrop Tree.

A tree found along streams from Surry, Mecklenburg and Davidson Counties west into the mountains. It is usually small, but is said by Ayres and Ashe to

occasionally reach a height of 100 feet in the rich, damp hollows of the Smoky Mountains. Leaves oblong or ovate, about 3-5 inches long, tomentose beneath, very finely toothed; flowers white, pinkish toward the base, bell-shaped, drooping, very pretty; fruit a dry pod with four broad wings. This tree is a fine object when in bloom and does well in cultivation. Date of flowering in Davidson County: April 23, 1916.

OLIVE FAMILY

(OLEACEAE)

153. Fraxinus americana L. White Ash.

This is the largest, most useful, and most widely distributed ash in the state, occurring abundantly in the mountains and Piedmont in rich moist soil, and extending down the valleys into the coastal plain. Leaflets 5-9, usually 7, decidedly whitish (silvery) below, smooth on both sides, or occasionally tomentose below, margins even or finely toothed; fruits short and plump, the wing long, varying from lanceolate and pointed to broader, oblong and notched at the end, about 2-4½ sixteenths inch broad, not extending down the sides of the seed. Twigs and leafstalks smooth. Examples: tree by road below apple orchard, Glenn Burnie Farm, and trees on street corner opposite Episcopal Church.

154. Fraxinus biltmoreana Beadle. Biltmore Ash.

This ash has been separated from the American Ash on account of the even more plump seeds and the permanently hairy twigs, leaf-stalks, mid-rib and under side of leaflets. Its distribution so far as known at present is along the larger streams of the lower mountains.

155. Fraxinus pennsylvanica Marsh. Red Ash, Green Ash.

This tree is distinguished from the other ashes by the very long and very narrow seed which is pointed below, by the spatulate wing, 4-5 sixteenths inch wide, which suddenly narrows at the seed and extends at least half way down its sides, and by the leaves being green, not whitish, and more or less velvety beneath. The leaf stalks and twigs vary from quite velvety to smooth and the margins of the leaflets are even or obscurely toothed. It is a common tree along rivers and low grounds in the Piedmont and lower mountains. The form with smooth twigs and leaf-stalks has been separated by some botanists as a variety or even as a distinct species (*F. pennsylvanica* var. *lanceolata* Sarg., or *F. lanceolata* Bork.), and has the common name of Green Ash. In Chapel Hill we have both extremes and also intermediates, all growing in low grounds and otherwise indistinguishable, so that we are inclined to consider them as variations of one species, as does Dr. Britton. Examples: tree in front of Swain Hall (pubescent

form), trees by Morgan's Creek, near Scott's Hole (smooth form).

156. Fraxinus profunda Bush. Pumpkin Ash.

The Pumpkin Ash is a tall tree of our coastal swamps as at Wilmington (Biltmore Herbarium), on Smith's Island and at Elmwood, Iredell County, (U. N. C. Herbarium). It is most like the Red Ash, but differs in the longer fruits, 2-3 inches long, and the stouter, shorter, and somewhat flattened seed part. The wing is broadly lanceolate and narrowed gradually to near the base of the seed. The twigs and leaf-stalks are pubescent and the leaves sparingly tomentose beneath, their margins entire or obscurely toothed. The trunk is tall and usually much swollen at the base.

157. Fraxinus Darlingtoniana Britton. Darlington's Ash.

This is also considered by some a form of the Red Ash which it closely resembles in most respects. The distinguishing point is the fruit, which is very narrow, the wing only about 2-2½ sixteenths inch wide, notched or pointed at the end, and extending about half way down the long and very narrow seed. The leaves and twigs are usually smooth, but occasionally velvety. The distribution of this form is so far imperfectly known. It occurs at Chapel Hill along smaller creeks and at Yadkin College, Davidson County, on the Yadkin River. Examples: tree on

north side of Bowlin's creek, opposite Glenn Burnie Farm.

158. Fraxinus Smallii Britton. Small's Ash.

Small's Ash is very common along larger streams and in low grounds in Orange and Mecklenburg Counties, and no doubt in most of the Piedmont section. Its distribution has not as yet been well worked out. It is distinguished from the others by the rather plump seed with a broad wing, which is 3-4 sixteenths inch wide and descends at least half way down its side. The twigs are smooth and so are the leaves, except along the veins beneath. The fruit is like that of the White Ash, but differs in the distinctly decurrent wing, and in the leaves being green beneath as in the Red Ash, not silvery as in the White Ash. Examples: trees along New Hope Creek at Durham road crossing, and on Morgan's Creek at Pittsboro road crossing.

159. Fraxinus caroliniana Mill. Water Ash.

This tree inhabits, in this state, only the deeper swamps of the lower half of the coastal plain, where, except for the rare Pumpkin Ash, it is the only species of the genus. It is easily distinguished from all the others by the very wide, veined wing which extends all around the slender seed; not rarely there are three wings extending out from the side of the fruit. The Water Ash is a rather small tree and the wood is inferior to most other ashes.

160. Chionanthus virginica L. Fringe-tree, Flowering Ash, or Old Man's Beard.

A small tree or shrub scattered through our woods, especially in moist soil along the streams, most abundant in the Piedmont section, but extending into the lower mountains, and sparingly along streams in parts of the coastal plain. It is very showy in the spring with drooping clusters of white, fragrant flowers, the linear petals about 1 inch long. Leaves oval to obovate, pointed or rounded at the end, thin and pubescent beneath and along the margins when young, but at maturity thick, dark green above, lighter and nearly smooth below, 3-8 inches long; fruit resembling a small olive, to which family the tree belongs, ½-¾ inch long, dark blue or nearly black, often with a glaucous bloom, flesh thin and stone large. Often cultivated for ornament. Thomas Meehan* notes that in reality there are male and female plants of this tree, although the distinction has not gone so far as to suppress either the stamens or pistils. Dates of flowering: April 15, 1903; April 19, 1908; April 22, 1909; April 11, 1910; April 27, 1916.

161. Osmanthus americanus (L.) B. & H. Devilwood, Wild Olive.

A small evergreen tree or shrub found behind the sand dunes and on the hammocks near the coast. The appearance of the tree is something like the

* Proc. Acad. Nat. Sci. Phil., June 21, 1887.

Dahoon Holly, but the leaves are opposite and the fruits are bluish-purple, 1/3-1/2 inch long, resembling a small olive. The flowers are small but abundant and fragrant. The wood is "devilishly" hard to split, hence the common name. A very attractive tree in cultivation.

BIGNONIA FAMILY
(BIGNONIACEAE)

162. Catalpa Catalpa (L.) Karst. Catalpa.*

A quick growing tree with durable wood that is excellent for fence posts. The large heart-shaped leaves are 4-12 inches long, hairy beneath; flowers about 1½ inches long, white with purple dots and two rows of yellow dots within, fragrant; fruit a long, slender, cylindrical pod, 10-12 inches long. The Catalpa is a native of the Gulf States, but has become thoroughly naturalized along streams and gullies in many places throughout the state.

HONEYSUCKLE FAMILY
(CAPRIFOLIACEAE)

163. Viburnum prunifolium L. Black Haw.

A low tree common in damp woods and along streams throughout the western and Piedmont sec-

* The Paulowlonia or Princess Tree (*Paulownia tomentosa* (Thumb.) Baillon), introduced from China or Japan, is a quick-growing, coarse tree with large, heart-shaped leaves, 6-12 inches long, or on young shoots much larger, very hairy beneath; flowers fragrant, about 2 inches long, bluish, in large clusters about 1 foot long. In winter the tree is loaded with smooth, pointed, ovate pods, 1-1½ inches long, and has conspicuous clusters of velvety buds. Though inferior to many of our native trees, it has been planted extensively in yards and has now sparingly escaped in waste places. Dates of flowering: April 17, 1903; April 12, 1908; April 15, 1909; April 5, 1910; April 16, 1916.

tions of the state. The bark is very rough, resembling the bark of the Dogwood; the leaves small, 1-3 inches long, ½-2 inches broad, finely toothed, a dark, but rather dull green, leaves and leaf-stalks smooth; buds long, gray, the lower part enlarged; flowers small, white, borne at the ends of the branches in clusters 2-4 inches across; fruits bluish-black with a glaucous bloom, not so blue as in the next species, ¼-1/3 inch long, flesh thin, sweetish, stone nearly disc-shaped, flat. In some parts of the state most of the plants have been dug up for the bark of the roots, which is used in medicine. Dates of flowering: April 4, 1903; April 5, 1909; April 1, 1910; April 22, 1915; April 13, 1916. Examples: trees in woods west of athletic field.

164. Viburnum rufidulum Raf. Blue Haw.

A small tree of either damp or dry woods of the coastal plain and part of the Piedmont, extending at least as far west as Davidson County. At Chapel Hill it is much more common than the Black Haw. Bark rough with much the appearance of the Black Haw, but the leaves are larger and broader, 2-4 inches long, 1-2½ inches broad, thicker, a lighter green, shiny above, and when young covered below and on the leaf stalks with a red tomentum. Some of this tomentum wears off during the season, but it is always to be detected at least on the veins beneath, on the leaf-stalks of the smaller basal leaves and covering the buds which are not so large as in the

CALIFORNIA

Black Haw; flowers white, in clusters 3-6 inches across; fruits deep blue with a glaucous bloom, 1/3-1/2 inch long, larger, fleshier, and juicier than in the Black Haw, the stone elliptic and flat. In Chapel Hill where both the Blue and Black Haws are common, the former can be distinguished easily by the larger, shining leaves with reddish tomentum, the red buds, and by the larger, bluer fruits. Examples: trees along Battle's Branch and in low places below Mr. Tom Ellis' home.

165. Viburnum cassinoides L. Withe-rod, Possum Haw.

A small tree or shrub along streams throughout the mountains, and probably also along branches and bogs in the upper part of the coastal plain as it occurs in such situations in South Carolina. Leaves ovate to oblong, 1-4 inches long, 3/4 to 2 1/4 inches broad, edges toothed, entire or inrolled, thick, dull above, and usually with many minute red dots below; flowers white, in clusters 2-4 inches across; fruits elongated or spherical, about 1/4 inch long, yellowish and pink when young, blue-black with a bloom when mature, not edible, stones flattened.

166. Viburnum Lentago L. Nanny-berry, Sheep-berry, Sweet Viburnum.

A small tree or shrub found along streams, low grounds, and moist hillsides of the mountain region. Leaves ovate to oval, 2 1/2-5 inches long, 1-1 1/2 inches broad, closely toothed, hairy when young, bright

shiny green above, lighter and with many black dots beneath at maturity, winter buds long pointed, red, and covered with a scurfy pubescence; fruits black or dark blue, with a glaucous bloom, about ½ inch long, sweet and juicy; stones flat. The bark of the root is used as the Black Haw in medicine.

ADDENDUM

Quercus Schneckii Britton. Swamp Red Oak.

A large tree of rich low grounds near streams with a general appearance that is much like that of the Pin Oak, but with less drooping branches, and in Chapel Hill with deeper green and more glistening foliage than in that species, and a more handsome tree. Leaves almost exactly like those of the Pin Oak in shape and texture, and with the same conspicuous tufts of down in the axils of the large veins, but averaging larger, the blade running 12-14 cm. ($4^3/_4$-$5^1/_2$ inches) wide and long on large trees. Acorns much larger and of different shape than the Pin Oak and the stalks usually much longer, varying from $^1/_5$-$^2/_3$ of an inch long. Acorn ovate, about one inch long counting the point, and nearly $^3/_4$ inch thick, nearly smooth above, slightly scurfy below; cup $^3/_4$ inch wide, only about $^1/_4$ inch deep, embracing about $^1/_4$ of the acorn; inside of cup shining and nearly or quite smooth. Taste of acorn flesh mildly bitterish. Buds much larger than in Pin Oak, $^1/_4$ inch long, pointed and narrowly ovate, bluntly angular, grayish brown. Bark very smooth on branches, very little roughened even on the main trunk below, the central region showing a striped appearance from the cracking of the thin bark. Examples: trees near Morgan's Creek on Mason Farm; at Scott's Hole; near Handcock's bridge on Bowlin's Creek, and one tree near Sparrow's Mill.

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Deciduous, not evergreen, falling off.
Decurrent, continued down the stem.
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Dicotyledon, a plant containing two primary leaves in the seed.
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Germinate, to sprout.
Glabrous, smooth, i. e., without pubescence, hairs, or wool, etc.
Gland, a small, hair-like projection with a swollen tip.
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Ovate, egg-shaped.
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Pedicel, the stalk of a single flower of a group.
Peduncle, a larger flower stalk from which the pedicels spring.
Peltate, shield-shaped, with the stem attached to the lower surface.
Periphery, outer edge.
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Petal, one of the colored leaves of a flower that make up the corolla.
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Pine, Black 5
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Pinnately compound, the leaflets arranged along a lengthened axis.
Pinus echinata 1
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virginiana 51
Raceme, a cluster of flowers in which each flower has an individual stalk, and all the stalks are attached along a lengthened axis.
Redbud 111
Rhamnus caroliniana 134
Rhododendron *catawbiense* p. 89
maximum 148
Rhus *copallina* .....p. 73
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Sabal Palmetto 19
Salix *alba* .....p. 28
babylonica .....p. 28
nigra 20
Wardii 21
Sassafras varlifolium 79
Scurfy, covered with small scale-like particles.
Service-Berry 87
Sessile, without a stem.
Shad-bush 87
Swamp 86
Sheep-berry 166
Shrub, a small woody plant, usually with several stems.
Snowdrop Tree 152
Sorbus americana 85
Sour Wood 146
Sparkleberry 147
Spatulate, spatula-shaped, flat and broadening toward the end.
Spontaneous, springing up without attention as if wild.
Spruce, Black 9
Red 10
Stamen, the pollen bearing part of the flower consisting of the filament and anther.
Stellate, star-shaped.

Stigma, the part of the pistil that receives the pollen, usually a knob at the tip.
Sumach, *Dwarf* .....p. 73
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Waxy 101
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Thuja occidentalis 17
Tilia americana 135
eburnea .....p. 84
heterophylla 136
Michauxii 137
pubescens 138
Tomentose, soft hairy.
Toothache Tree 115
Tree, a large, woody plant, at least 15 feet high, and usually with a single stem.
Tree of Heaven .....p. 73
Truncate, ending abruptly as if cut across.
Tsuga canadensis 12
caroliniana 13
Tulip Tree 77
Ulmus alata 68
americana 67
fulva 66
Umbel, a flat-topped flower group in which the flower stalks spring from near the same point.
Umbrella Tree .....p. 73
Vaccinium arboreum 147
Viable, alive, capable of sprouting.
Viburnum cassinoides 165
Lentago 166
prunifolium 163
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